OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

AUGUST 7, 1950
VOLUME 39, No. 16

aug 14, 60

AMERICAN DYESTUFF REPORTER

DEVOTED TO TEXTILE CHEMISTRY · BLEACHING · DYEING · PRINTING · FINISHING

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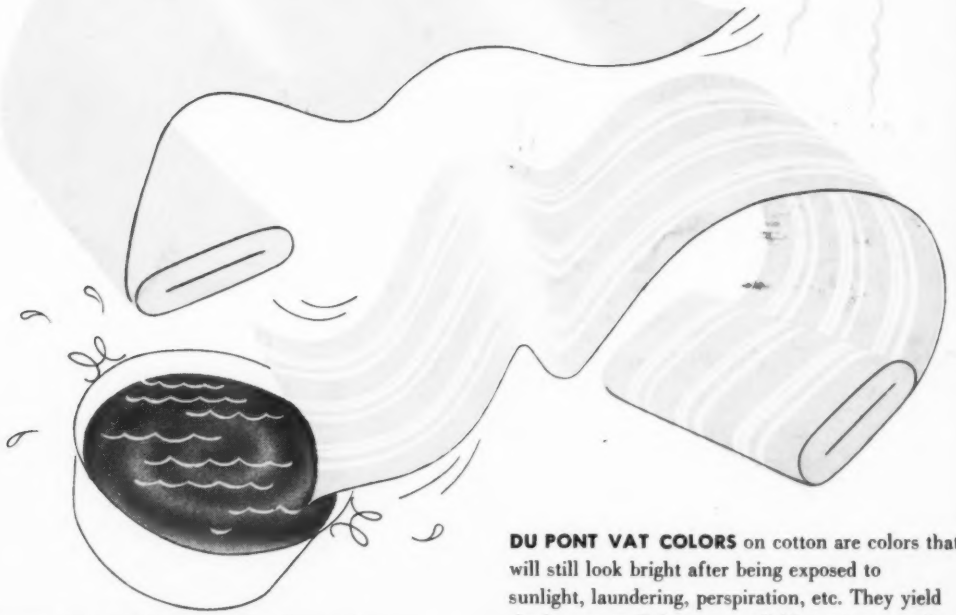
COTTON loves the sun



Always dye with an eye to the end use

Du Pont Dyestuffs

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

DU PONT VAT COLORS on cotton are colors that will still look bright after being exposed to sunlight, laundering, perspiration, etc. They yield the best over-all fastness available on cotton today. The Du Pont line includes PONSOL* (anthraquinone-type dyes), SULFANTHRENE* (thioindigoid and related dyes), and LEUCOSOL* (specially prepared anthraquinone types for printing). Why not investigate these colors? Our Technical Staff will work with you in turning out dye jobs which assure customer color-satisfaction. E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Division, Wilmington 98, Delaware.

*Reg. U. S. Pat. Off.

From laboratory flask to end product. The results obtained reflect the high quality of the Naphthols and Beta Oxy Naphthoic Acid . . .

Announcement!

ACETATE BLACK DYERS . . .

amazing new developments have been taking place
in the improvement of our **AMACEL* BLACKS.**

Absolutely tops! the NEW, IMPROVED

Amacel BLACKS

. . . BLACK G.S.
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As developed with Developer BON or BONASOL* these new, improved *Amacels* give the finest **developed blacks** obtainable. Perfected through the latest scientific advancements, they offer to a greater degree than ever, better fastness—simplified application—consistent shade purity. Both are suitable for box or jig . . . both are highly dispersed—**practically water soluble**—holding stain on adjacent white viscose to a minimum.

American Aniline was the first successful U. S. producer of dyes designed especially for acetate fibres, and high quality has kept *Amacels* at the top in this field.

For detailed information on *Amacel Black G.S.* and *Amacel Black IV Extra*, as well as special data regarding your own particular requirements, consult our nearest branch.
A.A.P. technicians are always happy to be of service.

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The greatest names in textiles insist on Atlantic *quality—controlled* dyestuffs

Anthravat* *Anthraquinone vat dyes*

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Atlantic Superfast *Direct Dyes*

Atlantic Direct *Direct Dyes*

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CABLE ADDRESS: "ANILDYE-PASSAIC"

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American Dyestuff Reporter, Vol. 39, No. 16, August 7, 1950. Published every other Monday. Copyright 1950, by Howes Publishing Co., Inc., 44 E. 23rd St., New York 10, N. Y. Domestic subscription, $5.00; Canadian, $6.00. Foreign, $10.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y., Post Office, under the act of March 3, 1879.

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IMPARTS IMPORTANT "SELLING FEATURES" TO ALL TEXTILE FABRICS

PERMITS FABRICS TO "BREATHE"
STABLE . . . SAFE . . . CLEAN . . . EASY-TO-USE

In addition to providing highest possible water repellency, MIGASOL PJ helps prolong the life of fabrics . . . improves the hand and drape of materials . . . and keeps fabrics fresh and new looking. Samples on request.

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HYGROSCOPIC AND PLASTICIZING AGENT

FOR VAT PRINT PASTE AND FOR SIZING

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CORPOLIN is a heavy non-volatile liquid —clear, colorless, odorless, free-flowing. Resembles glycerine in feel and appearance.

A highly concentrated solution of organic compounds in water, containing 70% solids.

NON-TOXIC; NON-FLAMMABLE; does not solidify, even in extreme cold.

WHAT IT DOES

Attracts and retains the right amount of moisture in VAT PRINT PASTE. Replaces glycerine at less than ½ the cost, without change in formulation. Introduces valuable economies through its power as a humectant. Excellent for sizing.

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Your Fancourt fieldman will be happy to show you how the latest Fancourt developments can improve the wearability and appearance of your stockings. Write, wire or phone for complete details.

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DYE OXIDATION

Bleaching . . . and dye oxidation processes . . . are most efficient when you use BECCO Hydrogen Peroxide, the simplest source of active oxygen. The BECCO Continuous Hydrogen Peroxide Bleaching system avoids costly batch operation . . . enables you to use less chemical and less steam per pound of material, and get whiter, brighter goods quickly at low cost. BECCO Hydrogen Peroxide is readily adapted to most types of dye oxidation processes.

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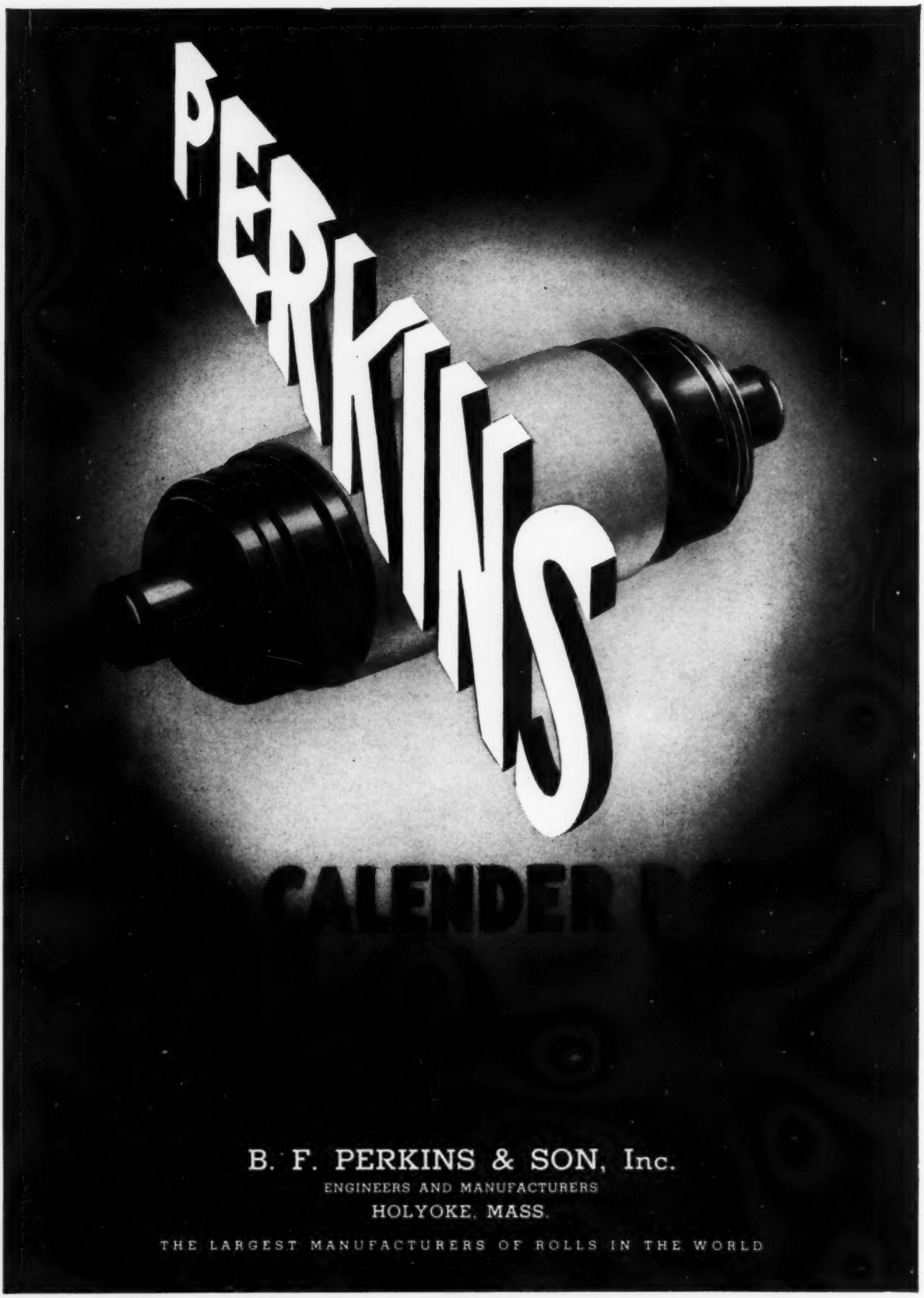
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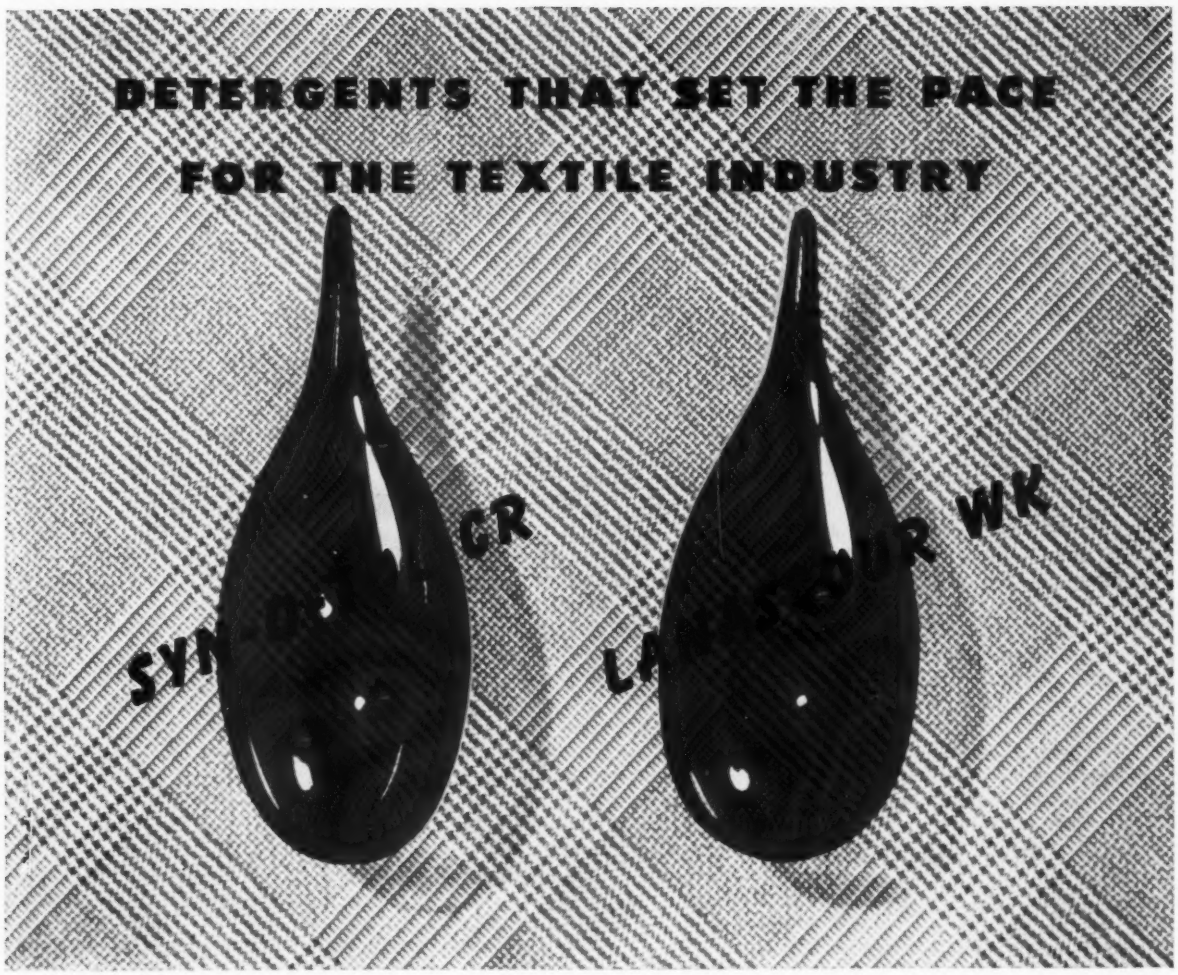

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Concentrated, Non-Sulfonated Detergent

SYN-O-TOL CR is a combination nonionic—anionic detergent, wetting agent and penetrant . . . contains less than 5% moisture!

SYN-O-TOL CR is a highly efficient detergent that provides a viscous "soapy" stock at about 20% concentration. It combines the advantages of high concentration with ease of handling.

SYN-O-TOL CR is highly effective in removing sizing material, oil, dirt, etc. . . . won't leave goods harsh and wiry . . . makes an ideal "soaping" agent for washing prints, provides synergistic action to detergent systems.

LANASCOUR WK

Synergistic Detergent for Wool Scouring

LANASCOUR WK combines high detergency action with superior penetrating power . . . produces resilient and lofty scoured wool.

LANASCOUR WK is economical and easy to use . . . scours gently and thoroughly in hard or soft water . . . holds dirt in suspension and won't form insoluble curds or scum.

In the scouring of wool, backwashing of tops, wetting of cotton-wool union fabrics in the fulling mill, processing blends of nylon or viscose staple and wool, LANASCOUR WK has no equal in effectiveness or economy!

For further information, send for technical data on LANASCOUR WK and SYN-O-TOL CR.

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When top fashion people aim at "hit" designs, they choose fabrics they are sure have been properly processed.

That's one reason why so many of America's leading mills, converters, finishers and dyers have turned to Colgate-Palmolive-Peet for high-quality wetting, fulling, scouring and dispersing agents.

There is a C. P. P. soap or synthetic detergent for every type of fabric—for every processing problem. Ask your local Colgate-Palmolive-Peet representative for details. Or, write today to Industrial Department, Colgate-Palmolive-Peet Company.

COLGATE FORMULA 25

For low-temperature washing ordinarily requiring olive oil soaps. Sold in eastern states only.

COLGATE WHITE SOAP FLAKES

High-grade thin white flakes. Not milled or polished. 90% anhydrous soap.

ARCTIC CRYSTAL FLAKES

Made from pure tallow, guaranteed to contain 88% or more soap. Titer approx. 42°C.

ARCTIC SYNTEX A, T, AND M

Synthetic detergents and wetting agents. Unsurpassed for many processing operations.

COLGATE FORMULA 10

92% oleic acid soda soap in flake form for silk degumming, wool scouring, all textile processing.

MENTOR BEADS

An alkyl aryl sulfonate detergent . . . of high purity . . . stable in acid and alkali . . . outstanding detergent and wetting properties.

FREE! New 1950 Handy Soap Buying Guide. Tells you the right soap for every purpose! See your C. P. P. representative, or write to our Industrial Department.

This material is country-spun, hand-loomed tweed of muted varied-colored check. 100% wool.

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Wool and the ULTRAWETS

From raw wool to finished sweater . . . much of the processing involved can be improved by using the ULTRAWETS—a family of alkyl aryl sulfonates tailor-made for particular jobs. For example:

IN CARBONIZING RAW WOOL: The problem of finding an economical low foaming wetting agent which is stable to acid to facilitate the removal of the cellulosic impurities from the raw wool is solved by using liquid ULTRAWET 30E or ULTRAWET 30DS.

IN SCOURING RAW WOOL, YARN, AND PIECE-GOODS: Liquid ULTRAWET 35KX is the most economical alkyl aryl sulfonate for volume use. Flake ULTRAWET K or bead ULTRAWET SK where dried products are desired.

IN DYEING: The liquids ULTRAWET 30E and ULTRAWET 30DS are particularly efficient as dye leveling agents.

Wool is just one of the textile fibers with which the ULTRAWETS are being used. They are equally important in the processing of cotton and synthetic fibers. We'll be glad to send you a brochure which will give you the facts about the whole ULTRAWET family. The Atlantic Refining Company, Chemical Products Section, 260 S. Broad St., Philadelphia 1, Pa.

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how NOPCO* FUA

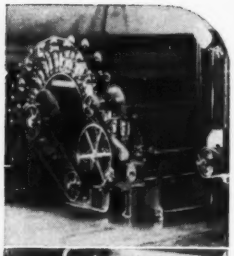
the modern self-fulling self-scouring wool oil adds up to better wool processing at less cost

Carding

Nopco FUA assures:

- Excellent fiber lubrication
- Elimination of static and fly
- No gumming of cards
- Elimination of glazing on leather rub roll aprons
- Cushioning of the leather

Result: Better carding—higher production—loftier, rounder roving

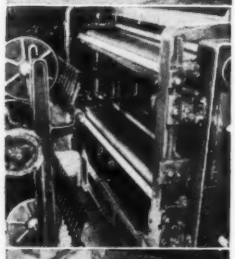


Spinning

Nopco FUA assures:

- Improved spinning—on mules or frames
- Fewer broken ends—because of increased yarn strength

Result: Higher spinning production



Steaming

Nopco FUA

does not set in the yarn after steaming, nor in the fabric when greige goods are crabbed.

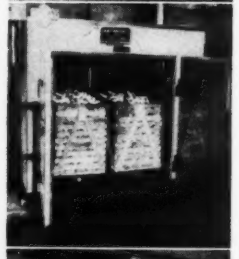
Result: No cloudy, shady piece dyeing

Fulling

Nopco FUA assures:

- Superior fulling (with excellent sudsing action) without addition of soaps or detergents
- Quick, uniform shrinkage—with good cover

Result: Simpler, improved fulling

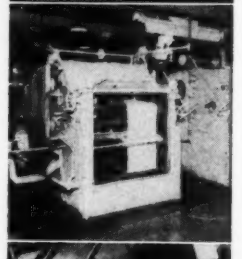


Scouring

Nopco FUA assures:

- Ultra-efficient scouring—again without addition of soaps or detergents
- Shorter rinsing time
- Very low residual oil content (0.2%)

Result: Better, faster scouring



No other wool oil duplicates the many advantages of Nopco FUA

Send for full information today.

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Formerly National Oil Products Company

HARRISON, NEW JERSEY

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Branches: Boston • Chicago • Cedartown, Ga. • Richmond, Calif.

For the dramatic colors that assure sales success, rely on National Technical Service and

National Aniline Dyes

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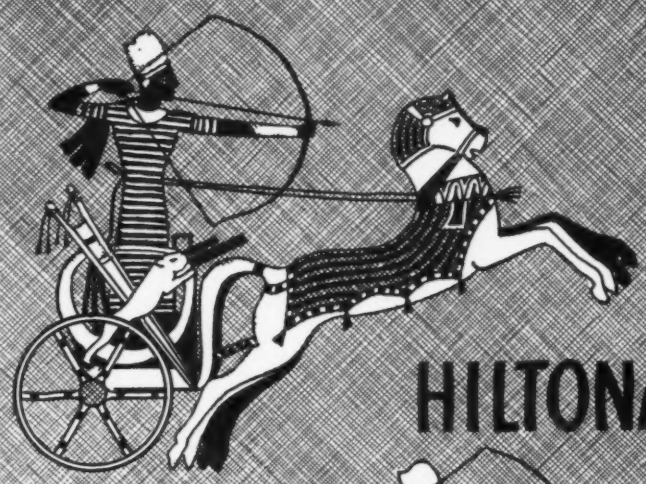
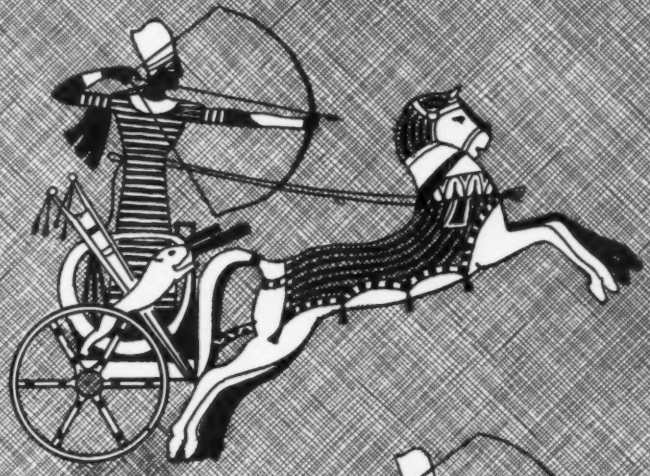
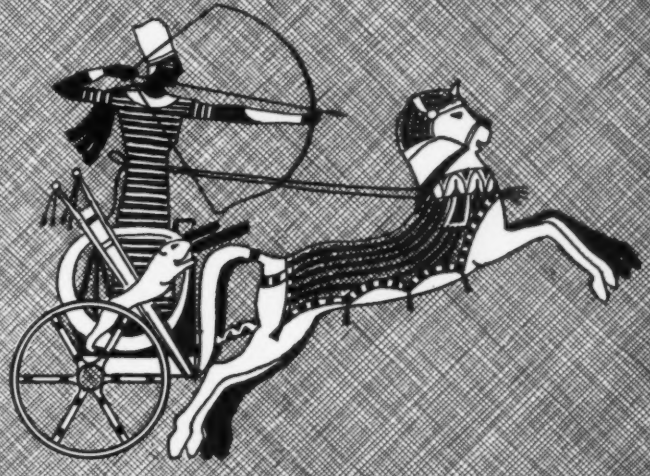


FOR BROWNS OF LASTING DISTINCTION *USE* HILTONAPHTHOL AS-HB*





Produces rich brown shades on cotton, rayon, and other cellulosic fibers having...

- **very good to excellent light fastness**
- **very good fastness to washing**
- **fairly good fastness to chlorine**

*(Pr. 307)

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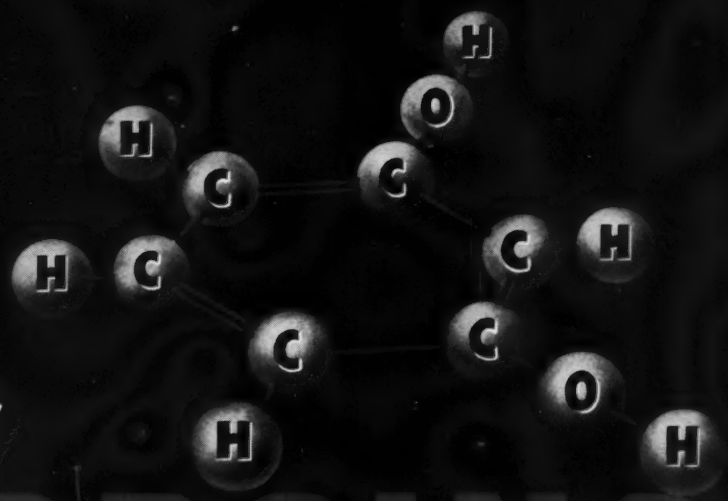
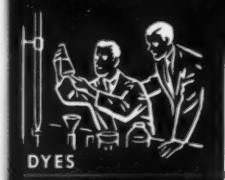


HEYDEN RESORCINOL

A Chemical of Many Uses . . .


DYES

HARMACEUTICALS

EXPLOSIVES

COSMETICS

Resorcinol is an extremely versatile chemical manufactured by Heyden in various grades to serve in the many applications of importance to industry, some of which are listed here:

PHARMACEUTICALS: In manufacture of antiseptics, antipruritic ointments, scalp preparations, etc.

DYESTUFFS: Intermediate for Eosines, Resorcin Browns and Greens, Erythrosines and other dyestuffs and developers.

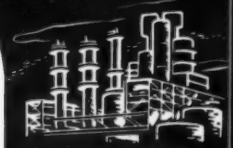
SYNTHETIC RESIN ADHESIVES: Resorcinol-formaldehyde resins which set rapidly at room temperature, giving a waterproof, fungus-proof bond.

RUBBER: Resins for improving the adhesion of rubber and textiles.

In addition to the above uses, Heyden Resorcinol goes into the manufacture of plastics, textiles, tanning agents, explosives, antioxidants, and many other important products.

AVAILABLE IN FIBER DRUMS.

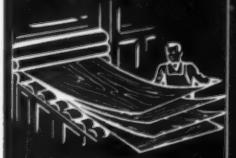
Samples and further information available upon request on company letterhead.


PETROLEUM

LEATHER

RUBBER

PLASTICS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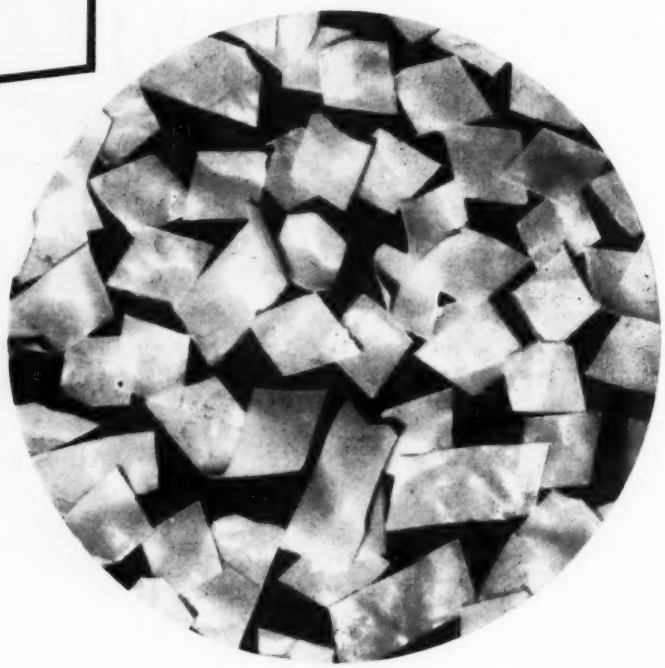
→ ANNOUNCING !

Profine
TEXTILE FINISH

For BETTER, MORE SALEABLE YARN and FABRICS

Here is a **finishing agent** which will meet—or exceed—your most rigid specifications. A 100% active product in **flake form,** Profine has an unusually wide range of application. → →



As a medium for imparting softness or body to yarns and fabrics, Profine is a star performer. Self-emulsifiable, its emulsions are unusually stable. It has no effect on shade or fastness to light...no tendency to form objectionable odors or discoloration.

Profine has already proved its superiority in preparing cotton and rayon yarns for the many subsequent weaving and knitting operations. Its ability to soften these fibers and impart a pleasing hand to fabrics has already resulted in its adoption for many processing operations.

For example, to soften cotton knit underwear material and cotton broadcloth . . . to reduce the danger of water spotting on acetate lining materials . . . to reduce "dusting off" of the starch in back-filling cotton fabrics . . . to give body and drape to spun rayons.

Profine has already demonstrated its ability to up-grade fabrics. You can rely upon it to increase the saleability of your fabrics. A month's trial will prove it.

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RAPIDASE®

Heat-stabilized amylolytic enzyme preparation, liquid. Solubilizes starch sizing in cotton, rayons and mixed goods . . . at extremely high temperatures. *De-size faster at lower cost with Rapidase.*

RAPIDASE-M **Intermediate strength—with all the characteristics, quality and value of Rapidase. For those who prefer a de-sizing agent of higher concentration.**

RAPIDASE-CONCENTRATED **For those whose needs demand a de-sizing preparation of highest unit strength. Because of its high concentration, greater economy is obtained in freight handling and storage expense.**

ZYMEX®

A powdered amylolytic enzyme preparation in high concentration. For those who prefer the convenience of a powdered enzyme . . . with all the advantages and economy of Rapidase.

SERIZYME®

Proteolytic type liquid de-sizing agent. For de-sizing fabrics containing gelatin, casein, soya and other protein and albuminous sizes. Produces a finer, softer hand, more uniform quality, clearer cross dyes.

In conjunction with any enzyme preparation . . . SACON . . . a non-ionic wetting agent and detergent. It is compatible with enzymes and is applicable in neutral, acid or alkaline solutions.

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A DURABLE GAS-FADING INHIBITOR

ARIPERM P M

Gives fabrics composed partially or wholly of

Acetate Rayon

— lasting protection against fading from atmospheric gases

— with excellent resistance to *WASHING AND DRY CLEANING*

Recommended for dyeing Light Shades, Pastels & Tints as well as medium and heavy shades.

With Ariperm P M there is no appreciable yellowing effect on white goods when exposed in the gas chamber — relatively little effect on light fastness of the color.

Simple application in scouring or directly in the dye bath.

Write for Technical Service Bulletin #201-121.1

Arkansas Co. INC.

NEWARK, NEW JERSEY

Photograph courtesy Celanese Corporation of America. Yarn content: Warp — Celanese acetate rayon dull filament; Filling—Celanese acetate rayon bright staple.

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serves you with a full-scale research and development program including chemicals for *all fibers, all fabrics.* Write Monsanto today about chemicals described below or for general information on chemicals of special use in your mill. Address: Textile Chemicals Department, Monsanto Chemical Company, Boston 49. Desk ADT 35.

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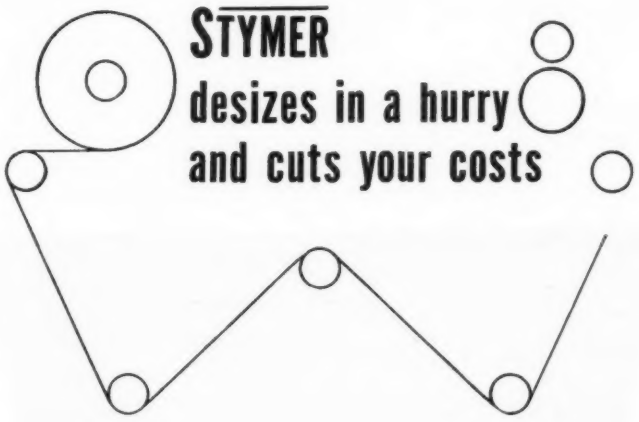

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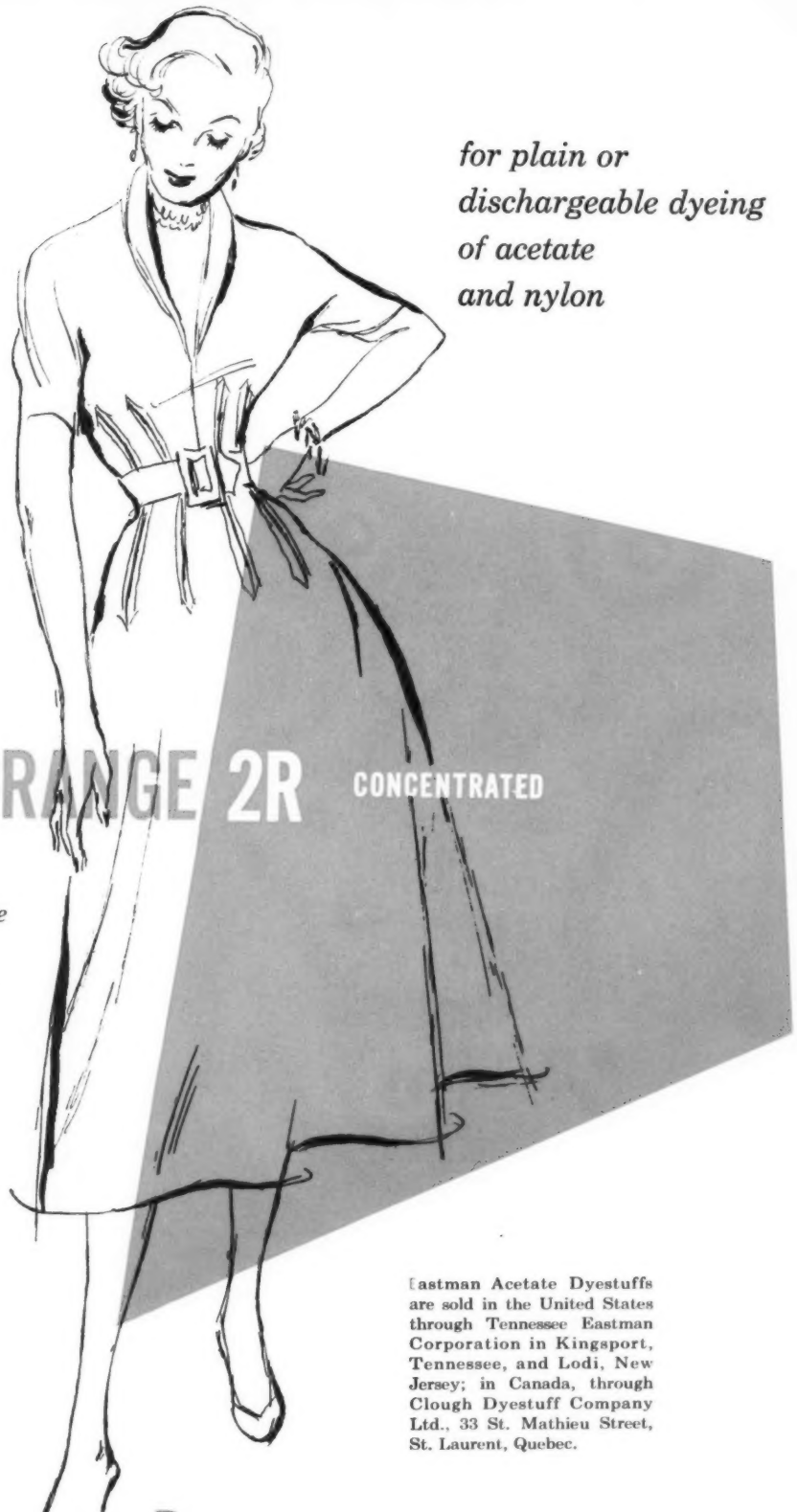

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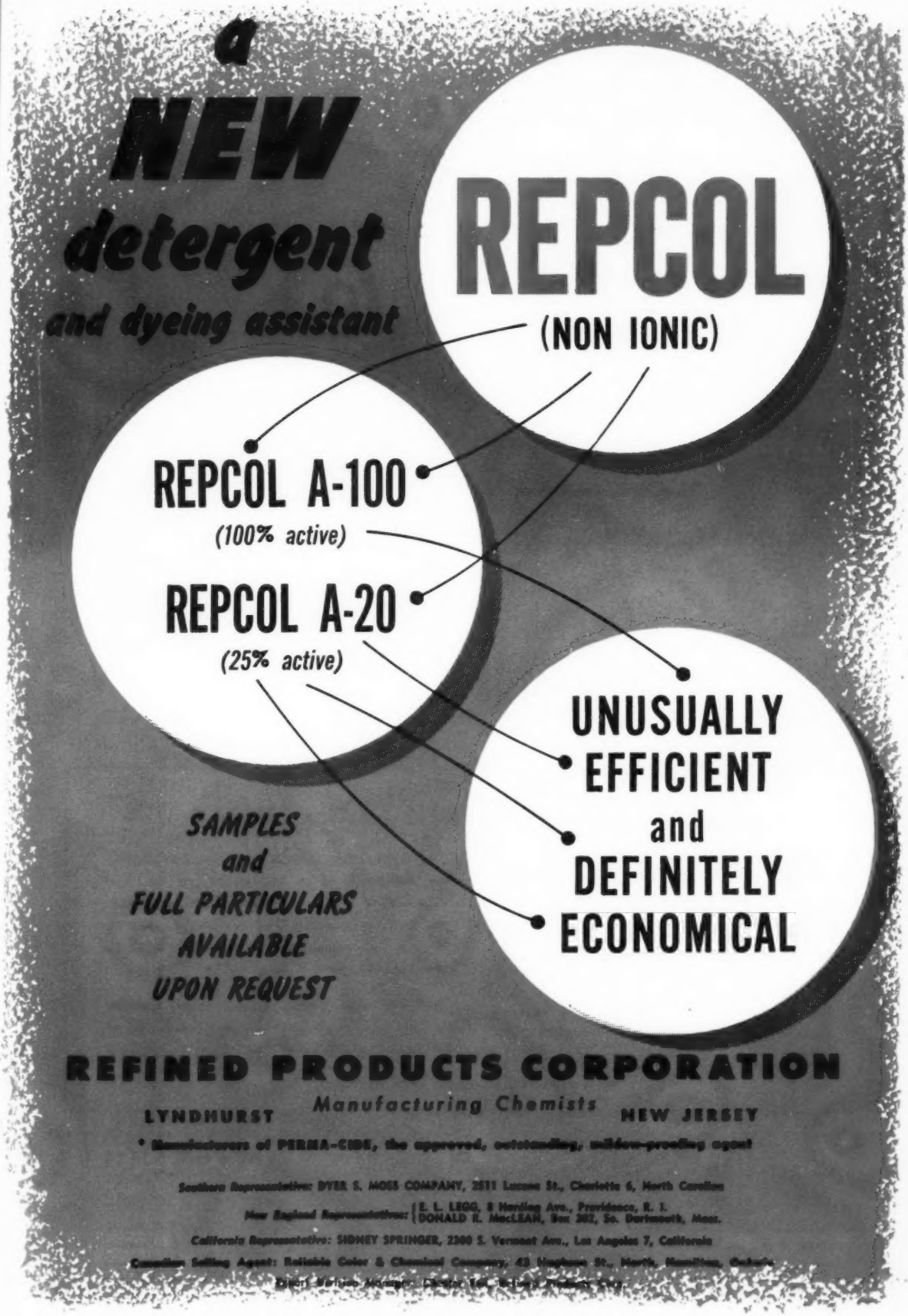
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Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

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American Dyestuff Reporter was founded in 1917 and the Textile Colorist and Converter (formerly Textile Colorist) was incorporated with it in January, 1949. Published every other Monday by the **HOWES PUBLISHING COMPANY, INC., 44 E. 23rd Street, New York 10, N. Y. C. R. Howes,** President, **Harry F. Crawford,** Executive Vice-President; **Norman A. Johnson,** Vice-President; **Ernest J. Finan,** Treasurer; **Myron D. Reeser,** Secretary; **C. Essenbreis,** Assistant Secretary.

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AUGUST 7, 1950
VOLUME 39 NUMBER 16

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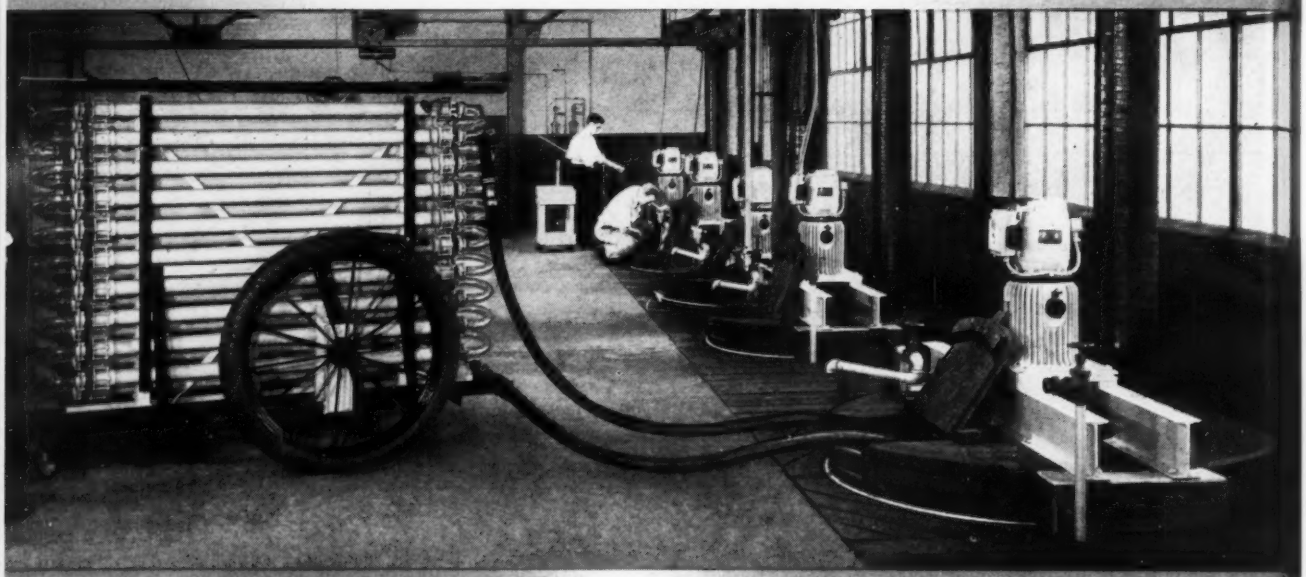

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VOLUME 39 AUGUST 7, 1950 NUMBER 16

TITANIUM COMPOUNDS AS FIRE-RETARDANT AGENTS FOR FABRICS*

I. M. PANIK, W. F. SULLIVAN and A. E. JACOBSEN
National Lead Co.-Titanium Division
Research Laboratories, Sayreville, N. J.

INTRODUCTION

THE use of titanium compounds as fire-retardant agents for textiles, paints, ceramics, building compositions and other materials has been described in patents, various articles and in the scientific literature. A study of these sources, however, shows that their application has not been widespread and that specific compounds have usually been combined with other materials which together produced a flame retardant effect.

The first application of a titanium compound as a flame-retardant agent was probably made in 1900 by Scholmann and deCastro *(17)* who patented a process for electrodepositing copper, zinc, nickel, iron or titanium on textile materials. This was followed in 1903 by Warr's disclosure of the use of titanium salts and sodium stannate with sodium silicate as the fixation agent for rendering textiles and other materials noninflammable *(21)*. In the same year, a similar type of treatment was patented by the Manufacture d'Impressions de Malaunay Ltd. *(5)*. In 1915, Harper *(8)* utilized the rare earth oxides of zirconium, thorium, beryllium and titanium to manufacture flame-retardant utensils and, in 1918, Goldschmidt *(7)* described a process for imparting "fire" and "acid resistance" to ceramic materials with titanic acid and alkalies. Nothing further appears to have been done until 1925 when Knecht *(12)* suggested the possibility of impregnating cotton and linen fabrics with titanium salts for retarding flame propagation. Following this, Vivas *(20)*, in 1929, patented a "fireproof" paint containing a mixture of titanium dioxide, borates, sodium tungstate and zinc sulfate. The next publication appears to have been in 1932 by Hertig *(10)* who used a mixture of titanium and aluminum sulfates to "heatproof" and impart "fire" retardancy to paper and craftboard. Henk *(9)*, in 1935, warned of injurious effects on textile fibers of certain "fire-retardant" agents, but listed as harmless sodium tungstate, sodium vanadate, sodium stannate, titanic acid and ammonium bromide.

More recently, a German patent *(6)* in 1937 disclosed the use of halides and thiocyanates of aluminum, antimony, iron, bismuth, tin and titanium as delustering, weighting, "fire-retarding" and mordanting agents, and in the same year Fliniaux *(3)* patented a "fire-resistant" mixture containing titanium dioxide for paints and glues. Further use of titanium dioxide in conjunction with other materials was made by Jacobs *(11)* in 1937 as a means for making rubber vulcanizate noninflammable. In the following year, Fliniaux and Dumas *(4)* patented a composition containing titanic acid and oxides of other metals for imparting "fire resistance" to buildings, and a British patent *(1)* appeared claiming the use of titanium dioxide in a composition intended for use as a fire-resistant paint. In 1939, Clayton and Heffner *(2)* patented a process which imparted fire-, mildew- and water-resistance to cellulose fabrics. They employed a composition consisting essentially of a chlorinated paraffin and titanium dioxide. A further advance along these lines was made in 1942 by Leathermann *(13)* who used a mixture of other metallic oxides with titanium dioxide and a chlorinated resin. Finally, in 1946, Timmons *(19)* described a "flame- and glow-retardant" solution consisting essentially of an insoluble antimony compound with a water-soluble resin but containing also inert pigments, such as iron, titanium and tin oxides.

In order to expand on the above studies, a rapid survey of the efficacy of readily available titanium compounds was initiated. For simplification, single component systems were investigated at first and were later followed by a study of binary mixtures. It was found that by the use of titanium compounds alone, cotton fabrics could be given a fair measure of flame retardance with little impairment to hand, tensile strength and other fabric properties. The treated fabrics were, however, only fairly resistant to laundering and exhibited little or no glow retardance. Of the additions studied to date, antimony oxide has proved most suitable for correcting these deficiencies and a binary mixture of this compound with titanium dioxide has resulted in a composition imparting relatively permanent flame- and glow-retardant properties to cotton fabrics.

THEORETICAL

Many theories regarding the mechanisms of fire-retardance have been propounded and a good summary has been given by Little *(14)*. These theories can roughly be divided into two categories, namely chem-

* Since this report was completed, an article dealing with the use of titanium-antimony solutions for flame retarding cellulosic materials has been published by H. C. Gulledge and G. C. Seidel, *Ind. Eng. Chem.* 42, 440 (1950).

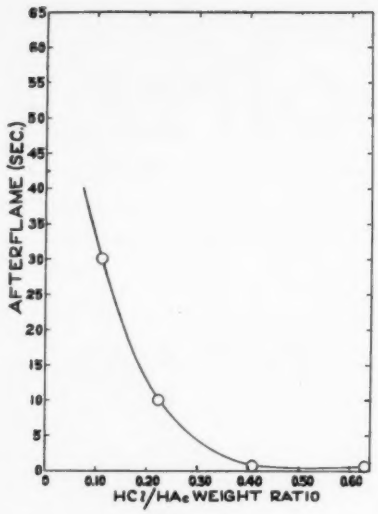

Figure 1
Effect of HCl/HAc Weight Ratio

ical and physical.

From the chemical point of view, an ideal flame-retardant agent would be one which would promote the decomposition of cellulose into carbon and water at elevated temperatures. Experimental work by Coppick [in Little *(14)*] has been especially helpful in clarifying this mechanism. He was able to show that known flame-retardant agents lowered the percentage of liquid hydrocarbon fraction and increased the amount of char formed during the decomposition of cellulose. Furthermore, it is known that the strong acids and alkalies, e.g., HCl, H_2SO_4, H_3PO_4, KOH, NaOH, etc., are powerful dehydrating agents and it might therefore be expected that the presence of these on the

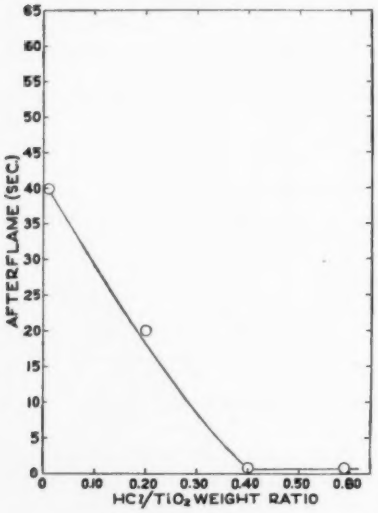

Figure 2
Effect of HCl/TiO_2 Weight Ratio

TABLE I
EFFECT OF HCl/HAc WEIGHT RATIO

HCl/HAc Weight Ratio	HCl/TiO_2 Weight Ratio (a)	45°—Microburner Flame Test		
		Afterflame (sec.)	Afterglow (sec.)	Char Area ($in.^2$)
0.107	0.258	30	>60	18.0
0.223	0.430	10	>60	12.5
0.403	0.688	0	>60	4.5
0.610	0.860	0	>60	4.5

(a) $CTiO_2$ = 100 g/l.

cellulose at flame temperatures would result in some dehydration and a minimum of flammable hydrocarbons. Since at ordinary temperatures these materials in a free state would be highly detrimental to the fabrics, it is necessary to provide a "carrier" which liberates the agents at flame temperatures but renders them inert at ordinary temperatures. A common example is the use of a (chlorinated) resin which is claimed to serve as an HCl carrier *(14)*. Ramsbottom *(16)* has also claimed that the Perkin's *(15)* process will not function without the presence of some bound NaOH. The actual dehydration mechanism is somewhat obscure although it has been proposed by Sisson [in Little *(14)*] that hydrogen bonding plays an active role.

Prominent among the physical theories is the idea of a protective coating on the material to be fire-retarded. Undoubtedly a good deal of the effectiveness of the borates and other low melting compounds is due to their ability to form frothy, insulating films. A second proposed type of physical mechanism has been derived from the ability of certain materials to liberate inert gases when heated. These gases are presumed to prevent flaming by excluding oxygen from the combustion area. It seems reasonable to assume that this type of action may play an important part of the flame protection provided by such materials as the ammonium halides, inorganic carbonates and volatile inorganic chlorides. Another type of physical protection which may be imparted to fabric is that supplied by substances having high rates of heat conductivity or being capable of undergoing endothermic transformations. Apparently no quantitative data are available for this type of mechanism, yet it seems that qualitatively not much protection could be expected because of it.

In the case of glow retardance, theories may again be divided into both chemical and physical categories. There is, however, far less experimental evidence for these theories than in the case of flame-retardance. Chemically, it has been proposed that the high exothermic heat of reaction for the combustion of carbon to CO_2 is responsible for the continued propagation of afterglow through materials *(14)*. Catalysts which promote the formation of CO, a reaction which is only weakly exothermic, are believed to be good antiglow agents. Physically, materials which have low melting points are believed to be effective due to their oxygen-excluding ability. Examples of the first case may be found in the ability of phosphates to prevent afterglow, whereas borates are examples of the second.

A study of the flame-retardant behavior of a number of titanium compounds has indicated that their mechanism may conform in part to that of the chemical theory. Data to be presented later indicate that a TiO_2 gel held by the fabric may serve as a carrier for small amounts of adsorbed or absorbed alkali which may be liberated at flame temperatures. To some extent there is undoubtedly a measure of physical protection imparted, but this is believed subordinate to the chemical behavior. A third possibility is that of a reaction with celllose. In the case of binary mixtures, such as titanium dioxide and antimony oxide, an unexpected permanence of the treatment may possibly be due to increased adsorption capacity, such as is well known under similar conditions in the catalytic industry *(18)*.

TABLE II
EFFECT OF HCl/TiO_2 WEIGHT RATIO

(a, b) HCl/TiO_2 Weight Ratio	Add-On (%)	45°—Microburner Flame Test			Tensile Strength (estimated)
		Afterflame (sec.)	Afterglow (sec.)	Char Area ($in.^2$)	
0.000	31.0(c)	40	>60	32.0	good
0.200	19.9	20	>60	18.0	good
0.400	19.9	0	>60	6.2	good
0.587	19.9	0	>60	6.2	fair

(a) HCl/HAc weight ratio = 0.403
(b) $CTiO_2$ = 100 g/l.
(a) HCl/HAc weight ratio = 0.403

TABLE III
EFFECT OF DRYING TIME AT 25°C.

(a,b,c,d) Drying Time (min.)	Add-On (%)	45°—Microburner Flame Test: Afterflame (sec.)	Afterglow (sec.)	Char Area ($in.^2$)	Tensile Strength (lbs./in.) (e)	Hand (estimated)	Appearance (estimated)
0	10.3	57	>60	18.0	262	good	very dusty
15	10.4	43	>60	12.5	226	good	dusty
30	11.8	29	>60	12.5	175	good	dusty
60	14.8	14	>60	10.4	182	good	slightly dusty
240	14.9	4	>60	4.5	214	good	very slightly dusty

(a) $\mathbb{C}TiO_2$ = 100 g/l.
(b) HCl/TiO_2 weight ratio = 0.925
(c) HCl/HAc weight ratio = 0.575
(d) $\mathbb{C}Na_2CO_3$ = 200 g/l.
(e) Tensile strength of untreated specimen = 226 lbs./in.

EXPERIMENTAL

TESTING EQUIPMENT—Since there is considerable interest in the flame- and glow-retardant treatment of cotton, 8 oz. desized cotton twill was used as a test material. The 45°-Micro-burner test *(14)* was used for evaluating the flame-resistant properties, although in some cases supplemental data were secured by the Vertical-Bunsen burner test *(14)*. Durability was evaluated by the standard running water leach and with a laboratory launderometer as developed in the N.R.C. Project Q.M.C. No. 27 and described in Little *(14)*. Tensile strength determinations were made qualitatively by ease of ripping and quantitatively with the Scott Tester *(14)*, whereas appearance and hand were judged visually and by feel.

SELECTION OF TITANIUM CHLORIDE-ACETATE SOLUTION — Preliminary experiments were carried out with readily available materials such as pigmentary grade TiO_2, aqueous solutions of titanium tetrachloride, titanium sulfate, titanium chloride-acetate and titanium dioxide sols. The usual technique was to impregnate the fabric initially with these materials, fix the TiO_2 by precipitation with alkali (except the pigmentary grade TiO_2) and wash out the resulting salts. Considering all properties obtained, the chloride-acetate solutions appeared to hold the most promise and hence it was decided to specialize on this type. For the sake of completeness, mixed organic acid-chloride solutions of other organic acids were investigated but appeared to show no marked advantages over the acetate-type solutions.

Titanium chloride-acetate solutions having a wide range of composition can be prepared by several means only one of which will be described here. Lead acetate solution was added to titanium tetrachloride solution, keeping the temperature below 25° C. and the insoluble lead chloride filtered off. HCl/HAc weight ratios and total concentration of TiO_2 were controlled by the initial concentrations of the reacting solutions. Binary mixtures, such as those employing antimony compounds, were made by simply dissolving antimony trichloride in the titanium chloride-acetate solution. The technique for impregnating the fabric consisted of immersing it in the solution, squeezing to the desired pick-up with a hand wringer, drying a desired time, immersing in an alkaline bath, washing and drying. The effect of drying times, temperatures, concentrations and other variables will be described below.

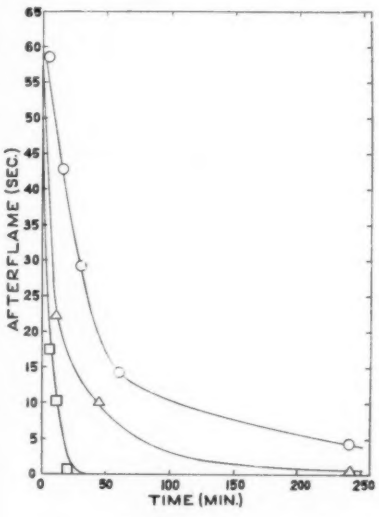

Figure 3

Effect of Drying Time and Temperature
○ At 25°C.
△ At 60°C.
□ At 100°C.

EFFECT OF VARIABLES USING TITANIUM CHLORIDE-ACETATE SOLUTIONS

One of the first variables investigated with titanium chloride-acetate solutions was the HCl/HAc weight ratio. This had a definite effect on the time of afterflame as shown in Table I and represented graphically in Figure 1. These data, which show that an amount of HCl above a minimum value is necessary to prevent afterflaming, were obtained by immersing the cloth in the respective solutions and drying 24 hours at room temperature. It should be noted that the titanium dioxide concentration was constant in this series. A decrease in tensile strength of the fabric with increased HCl/HAc weight ratio was also observed. This was undoubtedly due to the known tendering action of fabrics by HCl.

The next variable studied was therefore that of neutralizing the solution by sodium hydroxide directly before the impregnation step. Table II shows the results obtained for the samples which were otherwise treated as in Table I. For convenience, the neutralization has been looked upon as effecting the HCl/TiO_2 weight ratio only.

Graphical results are given in Figure 2 and show that a fair compromise between flame retardance and tensile strength can be achieved by this technique.

Probably the most important variable

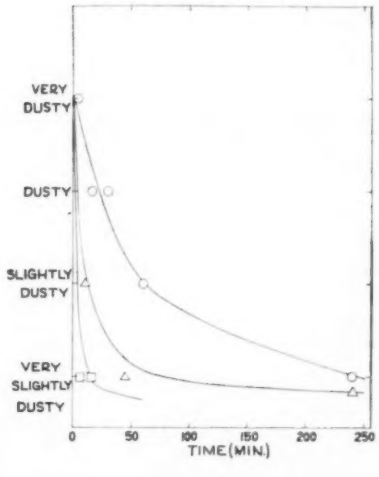

Figure 4

Effect of Drying Time and Temperature
○ At 25°C.
△ At 60°C.
□ At 100°C.

TABLE IV
EFFECT OF DRYING TIME AT 60°C.

Drying Time (min.) [a]	Add-On (%)	45°—Microburner Flame Test: Afterflame (sec.)	Afterflame (sec.)	Char Area (in.²)	Tensile Strength (lbs./in.)	Hand (estimated)	Appearance (estimated)
0	10.3	57	>60	18.0	262	good	very dusty
10	10.6	15	>60	10.4	228	slightly stiff	slightly dusty
45	9.7	10	>60	10.4	230	good	very slightly dusty
240	11.5	0	>60	4.5	67	stiff	very slightly dusty

(a) Solutions as in Table III

TABLE V
EFFECT OF DRYING TIME AT 100°C.

Drying Time (min.) [a]	Add-On (%)	45°—Microburner Flame Test: Afterflame (sec.)	Afterflame (sec.)	Char Area (in.²)	Tensile Strength (lbs./in.)	Hand (estimated)	Appearance (estimated)
0	10.3	57	>60	18.0	262	good	very dusty
5	12.9	17	>60	12.5	213	good	very slightly dusty
10	14.4	10	>60	8.0	very poor	good	very slightly dusty
20	12.8	0	>60	6.2	very poor	fair	slightly discolored
25	.....	.....	destroyed	.....	.....	.....	.....
60	.....	.....	destroyed	.....	.....	.....	.....
250	.....	.....	destroyed	.....	.....	.....	.....

(a) Solutions as in Table III

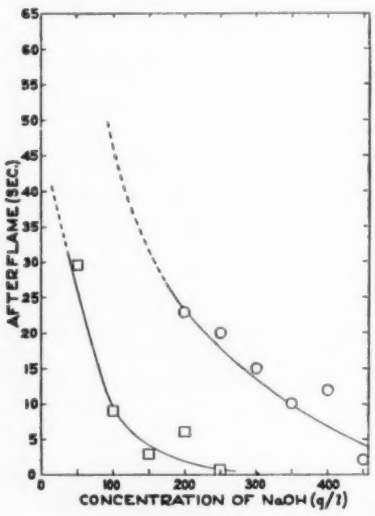

Figure 5
Effect of NaOH Concentration
○ **HCl/TiO_2 Weight Ratio = 0.474**
□ **HCl/TiO_2 Weight Ratio = 0.837**

studied was the drying time prior to immersion in an alkaline bath. Titanium chloride-acetate solutions, when studied alone, were found to set to a transparent, water-insoluble gel on aging, the rate depending on several factors, as time, temperature and composition. Data given in Tables III, IV and V and graphically in Figures 3 and 4, show that a minimum time of setting is necessary to secure flame retardance, good hand and appearance, and that this time is shorter the higher the temperature employed.

Figure 4, in which the appearance is plotted as a function of drying time and temperature, especially emphasizes that a minimum set time is necessary to obtain satisfactory appearance and nondusting. Regarding mechanism, it seems reasonable to assume that the invisible, insoluble gel particles have a higher specific surface than flocculated (visible) particles and hence have more adsorptive capacity. They would therefore be expected to function as a more efficient carrier.

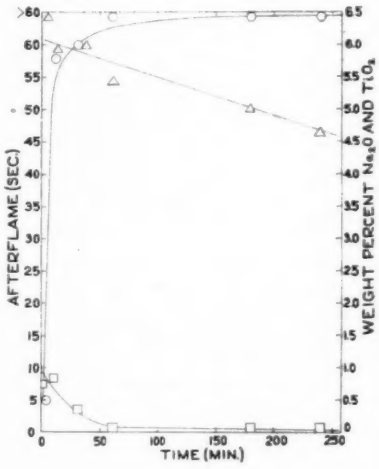

Figure 6
Effect of Tap Water Leaching
○ **Afterflame**
△ **TiO_2 Analysis**
□ **Na_2O Analysis**

TABLE VI
EFFECT OF NaOH CONCENTRATION (HCl/TiO_2 WEIGHT RATIO = 0.474)

C_{NaOH} (g/l.) [a,b,c]	Add-On (%)	45°—Microburner Flame Test: Afterflame (sec.)	Afterglow (sec.)	Char Area (in.²)	Tensile Strength (estimated)	Hand (estimated)	Appearance (estimated)
0	6.1	—	—	C.B. [d]	poor	good	good
100	11.1	—	—	C.B.	good	good	good
150	11.2	—	—	C.B.	good	good	good
200	12.1	23	>60	12.5	good	good	good
250	13.4	20	>60	12.5	good	good	good
300	13.2	15	>60	12.5	good	slightly stiff	good
350	13.3	10	>60	12.5	good	slightly stiff	good
400	17.9	12	>60	10.4	good	slightly stiff	good
450	18.8	2	>60	8.0	good	stiff	good

(a) C_{TiO_2} = 100 g/l.
(b) HCl/TiO_2 weight ratio = 0.474
(c) HCl/HAc weight ratio = 0.199
(d) Completely burned

TABLE VII
EFFECT OF NaOH CONCENTRATION (HCl/TiO_2 WEIGHT RATIO = 0.837)

C_{NaOH} (g/l.)[a,b,c]	Add-On (%)	45°—Microburner Flame Test: Afterflame (sec.)	Afterglow (sec.)	Char Area ($in.^2$)	Tensile Strength (estimated)	Hand (estimated)	Appearance (estimated)
0	3.2	43 ig.[d]	>60	C.B.[e]	fair	good	good
50	15.7	29	>60	12.5	fair	good	good
100	12.4	9	>60	8.0	fair	good	good
150	14.2	3	>60	4.5	fair	good	good
200	16.7	6	>60	4.5	good	slightly stiff	good
250	13.9	0	>60	2.0	good	stiff	good
300	16.6	0	>60	2.0	fair to good	stiff	good
350	18.4	0	>60	2.0	fair to good	stiff	good
400	14.6	0	>60	4.5	fair	stiff	dusty
450	13.8	0	>60	4.5	fair	stiff	dusty

(a) C_{TiO_2} = 100 g/l.
(b) HCl/TiO_2 weight ratio = 0.837
(c) HCl/HAc weight ratio = 0.532
(d) Ignited during the twelve seconds of applied flame
(e) Completely burned

TABLE VIII
EFFECT OF TAP WATER LEACHING

Time of Leaching (min.)	Add-On (%)	45°—Microburner Flame Test: Afterflame (sec.)	Afterglow (sec.)	Char Area ($in.^2$)	Tensile Strength (estimated)	Hand (estimated)	Appearance (estimated)	(a) % Na_2O	(b) % TiO_2
0	18.4	5	>60	12.5	fair	good	good	0.76	6.5
10	13.4	58	>60	24.8	good	good	good	0.83	5.9
30	11.8	60	>60	C.B.[c]	good	good	good	0.29	6.0
60	10.8	>60	>60	C.B.	good	good	good	<0.1	5.4
180	6.6	>60	>60	C.B.	good	good	good	<0.1	5.1
240	6.2	<60	>60	C.B.	good	good	good	<0.1	4.6

(a) Determined with a flamephotometer
(b) Determined by the reduction of H_2SO_4 solution with zinc amalgam and titration with standard ferric ammonium sulfate solution
(c) Completely burned

Since previous results have shown that some degree of neutralization is necessary to prevent appreciable reduction in tensile strength, several series were prepared in which the concentration of alkali in the step following the initial impregnation was varied. Although the results of Table II have shown that partial neutralization of the titanium chloride-acetate solution can be carried out before the impregnation step, the stability of such solutions is affected. It was therefore judged more practical to alkali-treat after the initial impregnation. Tables VI and VII give typical data obtained for initial impregnating solutions having HCl/TiO_2 weight ratios of 0.474 and 0.837 respectively. Afterflame times for these samples are represented graphically in Figure 5 and demonstrate the necessity of employing sodium hydroxide concentrations greater than a certain value.

EVIDENCE FOR CHEMICAL FLAME-RETARDANT MECHANISM

While previous results have shown that several possible techniques are available for securing satisfactory flame retardance, tensile strength, hand and appearance, no evidence has as yet been offered to support the previous proposition that the flame-retardant mechanism involved may conform principally to the chemical theory, viz. the TiO_2 gel as a carrier for strong acid or alkali. Foremost among evidence available is the effect of water leaching on flame retardance. Table VIII shows typical results obtained for specimens impregnated initially with a titanium chloride-acetate solution, partially dried and treated in a sodium hydroxide bath. The time of afterflame may be seen to increase with leach time, whereas chemical analyses show that the Na_2O percentage likewise decreases and the TiO_2 content, except for mechanical losses, remains practically constant. Graphical results are given in Figure 6.

The alkali content may not only be

TABLE IX
EFFECT OF P_2O_5/NaOH WEIGHT RATIO

P_2O_5:NaOH Weight Ratio[a,b,c]	Na_2O (%)	P_2O_5 (%)	Add-On (%)	45°—Microburner Flame Test: Afterflame (sec.)	Afterglow (sec.)	Char Area ($in.^2$)	Tensile Strength (estimated)	Hand (estimated)	Appearance (estimated)
0	0.74	0.28	17.4	0	>60	6.2	good	good	good
0.10	0.87	0.58	17.3	0	>60	6.2	good	good	good
0.25	0.87	0.66	17.6	0	>60	8.0	good	good	good
0.50	1.30	3.70	27.0	5	>60	8.0	good	good	good
0.75	1.30	5.70	24.7	15	>60	10.4	good	good	good
1.00	1.30	5.50	27.7	16	>60	10.4	good	good	good
1.75	0.48	6.20	29.8	32	>60	12.5	slightly stiff	good	fair
2.00	0.25	6.20	28.7	42	>60	15.0	slightly stiff	good	fair
2.25	0.24	6.80	30.6	44	>60	18.0	slightly stiff	good	fair
2.50	0.22	6.60	28.9	58	>60	18.0	slightly stiff	good	fair

(a) C_{TiO_2} = 100 g/l.
(b) HCl TiO_2 = 0.930
(c) HCl/HAc = 0.610

TABLE X
SUBSTANCES USED WITH TITANIUM SOLUTIONS

Substance	Flame Retardance	Glow Retardance	Leach Resistance
$SbCl_3$	Yes	Yes	Yes
H_3BO_3	Yes	Yes	No
NaOH	Yes	No	Yes
Na_2SnO_3	Yes	No	Yes
Na_2ZnO_3	Yes	No	Yes
$SnCl_2$	Yes	Yes	No
$ZnCl_2$	Yes	Yes	No
$Al(C_2H_3O_2)_3$	No	No	No
$(NH_4)_2SO_4$	No	No	No
$(NH_4)_2HPO_4$	No	No	No
$SbCl_5$	Yes	No	No
$Mg_3(BO_3)_2$	No	No	No
$Mg_3(PO_4)_2$	No	No	No
$Na_2B_4O_7$	Yes	No	No
Na_3PO_4	No	No	No
Na_2WO_4	No	No	No
Na_2SiO_3	No	No	No
Na_2SO_4	No	No	No
$Zn_3(BO_3)_2$	No	No	No

lowered by water leaching but also by changing the adsorptive capacity of the TiO_2 carrier gel. This may be accomplished by converting the gel to a highly insoluble, more crystalline type of material by treatment with phosphoric acid. Data for specimens prepared by impregnating initially with titanium chloride-acetate solution, partially drying and treating in solutions having increased P_2O_5/NaOH weight ratios are presented in Table IX. Analytical data again show the decrease in Na_2O content with time of afterflame (except for a slight initial increase due to additional add-on). Results are given graphically in Figure 7.

In cases where the dehydrating agent is acidic in nature, the same basic type of mechanism may exist. An example of this case may be found in results previously reported in Table I in which decreasing amounts of HCl result in poorer flame retardance.

EFFECT OF VARIABLES USING BINARY SALT MIXTURES

A survey of results and techniques using titanium chloride-acetate solutions as starting materials show that good flame retardance, tensile strength, hand and appearance on treated specimens may be obtained, but that the specimens are deficient in two important properties, namely glow and leach resistance. Exploratory work with a variety of binary mixtures, one component always being titanium chloride-acetate (in solution), covered common, readily available inorganic compounds which were known to be used in

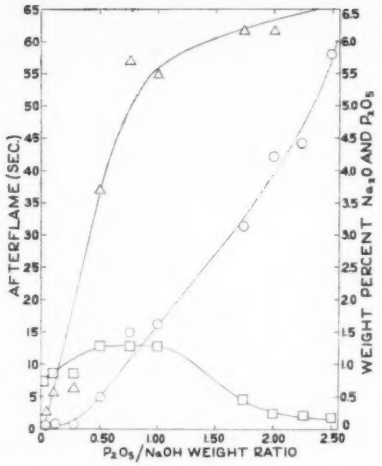

Figure 7
Effect of P_2O_5/NaOH Weight Ratio
○ Afterflame
△ P_2O_5 Analysis
□ Na_2O Analysis

TABLE XI
ANTIMONY TREATED SPECIMENS

$C_{Sb_2O_5}$ (g/l.)	Add-On (%)	45°—Microburner Flame Test: Afterflame (sec.)	Afterglow (sec.)	Char Area (in.²)	Tensile Strength (estimated)	Hand (estimated)	Appearance (estimated)	Remarks
64	14.3	—	—	C.B.(a)	poor	good	good	NH_4OH fumes
64	6.6	—	—	C.B.	poor	good	good	NH_4OH solution
64	6.1	—	—	C.B.	good	good	good	NH_4OH solution and laundered(b)
128	12.2	—	—	C.B.	good	good	good	NH_4OH fumes
128	12.0	—	—	C.B.	good	good	good	NH_4OH solution
128	10.1	—	—	C.B.	good	good	good	NH_4OH solution and laundered
192	20.4	25	>60	15.1	poor	fair	good	NH_4OH fumes
192	19.8	0	>60	4.5	good	fair	good	NH_4OH solution
192	14.9	—	—	C.B.	good	good	good	NH_4OH solution and laundered(b)
256	21.8	0	>60	6.2	good	stiff	dusty	NH_4OH fumes
256	21.8	—	—	C.B.	good	stiff	dusty	NH_4OH solution

(a) Completely burned
(b) Laundered in 0.5% neutral soap solution at 20°C.

TABLE XII
EFFECT OF Sb_2O_5/TiO_2 WEIGHT RATIO

Sb_2O_5/TiO_2 Weight Ratio (a,b,c,d,e)	Add-On (%)	45°—Microburner Flame Test: Afterflame (sec.)	(f) Afterglow (sec.)	Char Area (in.²)	Tensile Strength (estimated)	Hand (estimated)	Appearance (estimated)
0.400	13.2	15	120	18.0	good	good	dusty
0.500	16.4	16	95	10.4	good	slightly stiff	dusty
0.600	12.5	10	95	10.4	good	slightly stiff	dusty
0.700	21.6	6	40	8.0	good	slightly stiff	dusty
0.900	25.1	0	25	6.2	good	good	slightly dusty
1.300	29.4	0	0	4.5	good	good	very slightly dusty
1.900	32.9	0	0	3.0	good	good	very slightly dusty

(a) C_{TiO_2} = 100 g/l.
(b) HCl/TiO_2 = 1.02
(c) HCl/HAc = 0.72
(d) C_{NH_3} = 50 g/l
(e) Tap water leached for 10 minutes
(f) In uncharred area

TABLE XIII
EFFECT OF ALKALI NATURE AND CONCENTRATION

Alkali (temp.)	Concentration (g/l.)	45°—Microburner Flame Test (a,b,c,d,e) Add-On (%)	(a,b,c,d,e) Afterflame (sec.)	(f) Afterglow (sec.)	(f) Char Area (in.²)	Tensile Strength (estimated)	Hand (estimated)	Appearance (estimated)
NaOH (25°C.)	150	32.4	0	156	4.5	good	good	good
Na_2CO_3 (25°C.)	150	26.3	0	77	4.5	good	good	good
Na_2CO_3 (70°C.)	150	29.0	0	69	4.5	good	good	good
NH_3 (25°C.)	fumes	31.4	0	0	4.5	good	slightly stiff	good
NH_3 (25°C.)	50	29.4	0	0	4.5	good	good	good

(a) $CTiO_2$ = 100 g/l.
(b) Sb_2O_3/TiO_2, weight ratio = 1.30
(c) HCl/TiO_2, weight ratio = 1.02
(d) HCl/HAc weight ratio = 0.75
(e) Tap water leached for 10 minutes
(f) In uncharred area

TABLE XIV
LAUNDERING RESISTANCE OF TITANIUM-ANTIMONY TREATED SPECIMENS

Number of Launderings	45°—Microburner Flame Test (a,b,c,d,e) Add-On (%)	(a,b,c,d,e) Afterflame (sec.)	(f) Afterglow (sec.)	(f) Char Area (in.²)	Tensile Strength (estimated)	Hand (estimated)	Appearance (estimated)
1	24.3	0	0	4.5	good	good	good
2	22.4	0	0	4.5	good	good	good
3	22.4	0	0	4.5	good	good	good
4	21.6	0	0	4.5	good	good	good
5	22.3	0	0	4.5	good	good	good
6	22.5	0	0	4.5	good	good	good

(a) $CTiO_2$ = 100 g/l.
(b) HCl/TiO_2 weight ratio = 1.02
(c) HCl/HAc weight ratio = 0.75
(d) Sb_2O_3/TiO_2 weight ratio = 1.30
(e) CNH_3 = 50 g/l
(f) In uncharred area

fire-retardant compositions. A list of salts tested is given in Table X. The test procedure, in brief, was to dissolve the acid salts in the titanium chloride-acetate solution, impregnate, partially dry and alkali treat. In the case of alkaline salts, these were added to the sodium hydroxide solution. From these salts, antimony chloride was selected for further study since it imparted both glow- and leach-resistant properties. It is of particular interest to note that antimony chloride in itself is not satisfactory as a general fire-retarding agent, as is shown by the data of Table XI. Techniques employed in the study of this salt were similar to those found by experience to be satisfactory for titanium chloride-acetate solution, namely alkali treatment, washing and drying following the initial impregnation.

The first variable studied with this binary mixture was the Sb_2O_3/TiO_2 weight ratio which was varied from 0.4 to 1.9. Data presented in Table XII and represented graphically in Figure 8 show that a minimum ratio of 0.9 is necessary to secure flame retardance on water leached samples together with satisfactory tensile strength, hand and appearance. Glow retardance was improved over specimens treated with titanium chloride-acetate solutions alone, but is still somewhat deficient.

It was found possible to obtain a still further improvement in glow retardance and leach resistance without impairment of other properties by varying the nature of the alkali used for treatment. Results are given in Table XIII and graphically in Figure 9 show that NH_4OH in particular was very effective, especially when compared against NaOH. It was also somewhat superior to Na_2CO_3.

Further evaluations of specimens prepared by impregnating with titanium chloride-acetate-antimony trichloride solution partially drying, treatment in NH_4OH bath and washing out soluble salts showed that they had good fire-retardant properties, tensile strength, hand and appearance. These data are listed in Table XIV and show also that the specimens are able to withstand six launderings in 0.5% neutral soap solution at 70° C. without any decrease in fire-retardant properties.

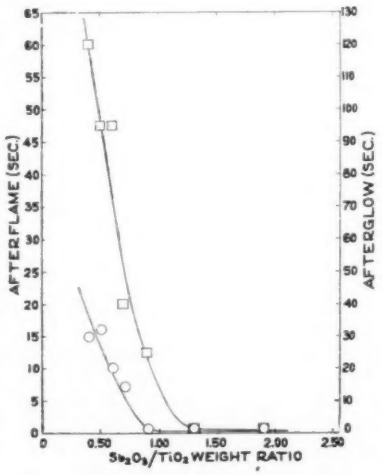

Figure 8
Effect of Sb_2O_3/TiO_2 Weight Ratio
○ Afterflame
□ Afterglow

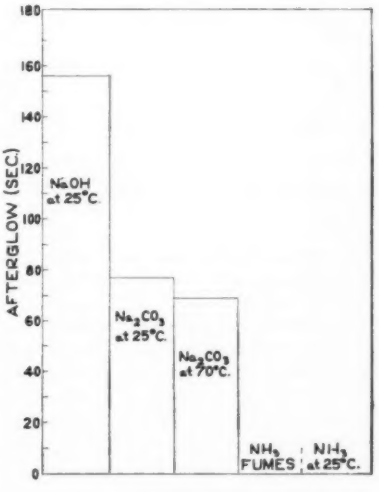

Figure 9
Effect of Alkali Nature and Concentration

TABLE XV
EFFECT OF ADD-ON FOR TITANIUM-ANTIMONY SPECIMENS

Add-On (%) (a,b)	45°—Microburner Flame Test: Afterflame (sec.)	Afterglow (sec.) (c)	Char Area (in.²)	Tensile Strength (lbs./in.) (d)	Hand (estimated)	Appearance (estimated)
4.2	50	—	24.8	172	good	good
6.3	49	—	24.8	222	good	good
8.5	25	120	18.0	225	good	good
11.5	23	120	12.5	241	good	good
14.5	0	45	6.2	219	good	good
20.4	0	0	6.2	201	good	good
21.0	0	0	4.5	222	good	good

(a) Sb_2O_3/TiO_2 weight ratio = 1.30
(b) CNH_2 = 50 g/l.
(c) In uncharred area
(d) Tensile strength of untreated cloth = 226 lbs./in.

An indication of the minimum percent add-on required for permanent fire retardancy was determined by impregnating initially with solutions at different concentrations to about 100% wet pickup and finishing in the usual way. Table XV and Figure 10 summarize these results. These show that a minimum add-on of about 15% is necessary to secure satisfactory fire retardance with cotton fabrics.

CONCLUSION

The above studies do not cover exhaustively the field of titanium compounds, alone or with other substances. To investigate each compound with all the possible variables associated with it would require a tremendous expenditure of work and time. Instead, a survey has been made and the most favorable cases developed into a process which with a relatively low add-on yields good general fire-retardant properties. A future study of more complicated systems may well result in a process having much better properties than have been reported now.

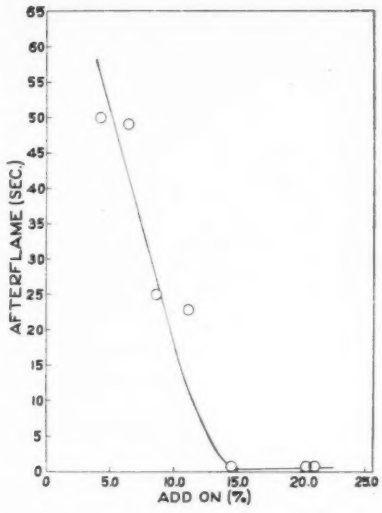

Figure 10
Effect of Add-On on Afterglow Using Titanium Antimony Solution

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ABSTRACTS

Synthetic Fibers; An Historical Survey

H. V. Potter, *Chemistry and Industry*, Dec. 17, 1949, p. 879-885.

The earliest suggestion that fibers might be made artificially appears to be that of Robert Hooke, who proposed in 1664 that the process employed by the silk-worm might be duplicated by man. Reaumur made a similar suggestion in 1734.

Swan invented in 1883 the process of squirting nitrocellulose solution through a die into a coagulating bath of water and alcohol. This device became the basic principle of all synthetic fiber production.

Chardonnet in 1884 patented a process for making "artificial silk" from collodion (an acetone solution of cellulose nitrate). The fiber so produced at first was highly inflammable, but in 1895 a method of denitration was introduced which made a less dangerous product. This process flourished until it was later replaced by viscose and other synthetics.

Cross and Bevan in 1894 undertook the production of fibers from viscose, which was finally successful in 1900, after countless difficulties had been overcome.

The Dreyfus brothers started production of cellulose acetate plastics in 1911, and commercial production of fibers began in 1920, the filaments being produced by evaporative spinning from solutions in acetone.

Fibers made from casein became a commercial reality in Italy in 1936. Peanut fibers were made experimentally in England in 1939 and will shortly be available in quantity. Similar fibers have been made from soyabean, corn, fish, and other proteins.

True synthetic organic fibers are built up by man instead of using natural fibers as a starting point. These include the fibers made from polyamides, polyvinyl de-

rivatives, polyethylene, polystyrene, and others. First and foremost is the polyamide or nylon group, developed by Carothers in 1938. Nylon differs from the earlier artificial fibers in being spun from a melt, rather than from a solution.

Copolymers of vinyl chloride with vinyl acetate, acrylonitrile, and vinylidene chloride have all produced fibers of considerable promise. Polyethylene monfilaments have also been made, possessing extreme resistance to chemicals.

Polyethylene glycol terephthalate (Terylene) is different in structure from any other fiber, natural or artificial. It is particularly resistant to deterioration by light.

The article closes with a table of the physical properties of the various fibers.—W.H.C.

Modern Textile Bleachery Employs Extensive Controls in Processing and Air Conditioning

Anon., *Instrumentation* **4**, 7-10, First Quarter, 1950.

The new Grace Bleachery of Springs Cotton Mills utilizes the latest advancements in processing machinery and instrumentation.

To control the temperature of the hot water used in all washing operations, Brown indicating temperature controllers and "ElectroniK" pyrometer controllers are used. The Becco rope bleaching ranges and the Mathieson open-width steamer range are completely instrumented for the control of temperatures, flows, liquid levels, and pressures. Also on the mercerizing range the flow rate is automatically controlled.

The dyeing ranges have temperature and flow control and the drying cans are pressure-controlled by recording gauges. All departments are air-conditioned, using Honeywell controls.

The article gives full details of all of these instruments, with illustrations and diagrams.—W.H.C.

Synthetic Fibers from Natural Proteins; Reactions with Formaldehyde

D. Traill, *Chemistry and Industry*, Jan. 14, 1950, p. 23-30.

It would seem that we have no definite proof of what happens when formaldehyde reacts with proteins. We know that the amino and the amide groups are certainly concerned, depending on the pH at which the reaction takes place. Other groups, such as the guanidyl, hydroxyl, and sulphydryl groups may be involved. We have no definite proof about the groups which take part in cross-linking. Under acid conditions the amide groups are definitely involved, and it is most probable that cross-linking takes place, forming a methylene link between amide and amide. Most synthetic fibers are hardened under acid conditions. Under alkaline conditions amine groups take part. Carefully planned researches with proteins and with amino-compounds are being carried out in various parts of the world, and yet we are not very far forward. Much of the difficulty is due to our limited knowledge of the proteins. We do not know what we are working with.

It does appear certain that some form of cross-linking is required when making synthetic fibers from proteins. This is due to the fact that these proteins have a large number of side chains and consequently the packing is poor and there is a lot of orientation. As a result we have poor cohesive forces between the polypeptide chains.

The author describes the researches of a large number of workers in this field.—W.H.C.

The Bleaching of Colored Work —A Warning

C. H. Bayley, *Textile J. Australia* **25**, 59-61, March, 1950.

The laundry industry has frequently been accused of using too intensive laundering methods, with consequent impairment of the life and appearance of fabrics and garments entrusted to its care. Now it is generally recognized that the bleaching operation, in which sodium hypochlorite is used, is a process designed to remove stubborn strains from white cotton and linen goods, and to restore the off-color that occurs, with use, in the fabrics of this type. It has come to be a recognized step in the standard white work formula, and it can be so controlled as to cause no substantial chemical damage in goods to which it is repeatedly applied.

It has long been the practice to bleach striped cotton shirts containing predominantly white areas. Unfortunately, it is also the practice in many quarters to bleach shirts with woven or printed stripes in which the extent of the white areas is very small and even where there are no white areas at all. We also know of cases in which shirts made in solid colors, e.g., blue and fawn, are bleached. This is current practice in many dry cleaning plants operating shirt units and in some laundries. There is no excuse for these practices.

Many (colored) striped shirts on the market today carry a synthetic resin finish applied to give crease resistance. These resins are mostly of a chlorine-retentive type, i.e., they absorb chlorine during the bleaching process; the chlorine so held cannot be removed by rinsing, but is liberated in the form of hydrochloric acid under the action of the heat of the finishing process, causing yellowing and severe chemical damage to the fabric. The finisher must avoid the use of such resins if the goods are obviously to be bleached in laundering. Also the garment manufacturer who uses such a fabric must first ascertain its ability to withstand normal laundry conditions.—W.H.C.

"Orlon" Acrylic Fiber—A New Fiber for the Canvas Goods Industry

J. B. Quig, *Textile J. Australia* **25**, 48-50, 72, March, 1950.

There are four principal factors directly related to seam failure in awnings and tents: exposure to sunlight (ultraviolet rays); failure to make a good stitch or seam; exposure to smoke and industrial fumes, which cause a degrading acid condition; and exposure to mildew. "Orlon" fiber has all of the characteristics necessary to make the best sewing thread to be used in the fabrication of awnings and tents.

"Orlon" fabrics exhibit remarkable resistance to degradation by sunlight and outdoor exposure. Exposure tests were made on awning fabrics in Florida at a location where ultraviolet rays are intense and industrial acid fumes are nil. Other exposures in the fume-laden area of cities have shown the superior resistance of "Orlon" to the combined influence of sunlight, smoke, soot, and acid fumes.

Cellulosic fabrics are deteriorated much more readily in northern urban areas where smoke, soot, and acidic gases are prevalent than in Florida, where there is an abundance of sunlight without the smoke and soot. Nylon fabrics are deteriorated much more readily by the high intensity sunlight of Florida than by the smoky acidic atmospheric conditions found in northern cities. Fabrics made of "Orlon" are in a class by themselves with regard to all of the above-mentioned factors.

Tests made in Wilmington, Delaware, involving the outdoor exposure of silk, rayon, linen, cotton, nylon, and "Orlon" yarn showed that "Orlon" yarn had maintained 77% of its tensile strength at the end of 1.6 years, while all of the other yarns had lost 100% of their tensile strength.

Soil burial tests comparing "Orlon" with sisal, treated and untreated Manila and cotton, jute, hemp, and nylon, have given results indicating that "Orlon" maintained 90% of its original strength, which was superior to the other fibers

tested. It is recognized that the good behavior of "Orlon" in proximity with soil will eventually be of great importance in the construction of covers for baseball fields, truck tarpaulins, tent floors, etc.—W.H.C.

Screen Printing Technique: Fine Line Reproduction

F. W. Mackenzie, *Dyer* **103**, 675-7, June 2, 1950.

It is difficult to obtain a fine line by conventional tracing methods. The finer the drawn line the less the deposit of drawing ink, and this spells disaster in the final result. There are several methods of approaching this problem but there is no complete answer. Photography can help, however, in quite a simple manner even without the use of a camera. Simple contact photography will be found most useful. (This process is described in considerable detail).

Screens prepared by photo-mechanical methods were known to have been used in 1917, and it is probable that such methods were known even earlier. Then, as now, bichromated gelatine was used as the sensitive colloid coating, and until comparatively recent years gelatine in one form or another had precedence, but is now being seriously challenged by such materials as polyvinyl alcohol.

The various difficulties experienced with bichromated gelatine are discussed, and means for overcoming them are suggested. The author reports that polyvinyl alcohol coatings, sensitized by bichromate or diazo compounds, are now beginning to be employed. Coating methods are the same as for bichromated colloids and exposure is to an actinic light source.—W.H.C.

Fixation of Pigments in Textile Materials, Some New Developments

Anon., *Textile Recorder* **68**, 75-6, June, 1950.

Experience in the production of water-repellent finishes on cotton and cellulose rayon materials by application of a cation-active auxiliary consisting of hydrophile and hydrophobe components, followed by a baking or curing treatment, has suggested a new method for fixing colored pigments in textile materials which might influence printing procedures.

For many years textile printers have made use of such substances as vegetables gums, albumen, gelatine, and even certain cellulose derivatives, for binding pigments to fabrics. More recently this use of pigments in printing has received increased attention and various new methods have been devised to take advantage of the binding power of synthetic resins —the Aridye printing process is of this kind.

In using synthetic resins as pigment binders some difficulty has been encountered in preserving the soft handle of the textile material. By contrast, it is known that many of the water-repellent auxiliaries now available naturally confer softness on the textile material to which they are applied. By using these water-repellent auxiliaries as binders for pigments in printing there is more likelihood of obtaining soft-handling prints.

Developments in this direction are foreshadowed by some new processes and auxiliaries recently discovered by I.C.I. Ltd. and disclosed in E. P. 622,967 and 633,932. Such products are distantly related to Velan (Zelan). The general idea is to use a thickened printing paste containing the colored pigment and one or more of these special auxiliaries, and then fix the pigment by steaming the fabric in an ager or preferably by heating it at 150°C. for two or three minutes in a baking chamber. Thereafter the fabric will be well washed so as to be left soft and with a colored pattern having excellent fastness to washing.

The chemistry of these various new compounds is described, and full details of the printing procedures are given.

Textile Industry Changes Pace

R. E. Wright and M. Harris, *Chem. & Eng. News* **28**, 38-9, Jan. 2, 1950.

The comparatively slow, evolutionary type of change to which the textile industry has been accustomed is giving way to a faster rate of advance—a rate resembling, in some instances, a revolutionary upheaval. The acceleration is caused primarily by pressures from two sources: the backlog of new products and processes developed during the past few years, and the economic pressure of declining markets which stimulates the search for novelty, improved quality, and reduction in costs.

Among the most dramatic of these changes, and one which shows clearly the impact of chemical research and technology on the textile industry, is the trend toward modification or displacement of established fibers from their traditional assignments. Already the consumer has seen evidences of this in the industrial field where, for example, rayon and nylon tire cords and Vinyon filter cloths are now well established; in domestic applications, where some of the newest synthetic fibers are finding employment in draperies and upholstering materials; and in apparel fabrics, where rayon and nylon are gaining increasing markets in shirting-type fabrics, and rayon is challenging wool in the summer suiting field.

Among the subjects mentioned in this review are a new method of producing cross-linkages in wool; the introduction of amino groups into cellulose, making it possible to dye it with acid dyes; a new flameproofing process for cotton and rayon, based on the use of titanium and antimony salts; the latest developments in research to control wool shrinkage; the production of several new fibers (Orlon, Dynel, Celcos, and Vicara); the "Thermosol" (high temperature) dyeing process; and the blending of the new fibers with cotton, wool, and rayon, to provide new standards of comfort in clothing.—W.H.C.

Doctor Blade Adjustment

Anon., *Dyer* **103**, 743-5, June 16, 1950.

Next to the engraved roller the doctor blade is the most important item in the roller printer's equipment. Without a well-set and efficient doctor blade edge, it is impossible to produce clear, sharply defined printing impressions. The setting and bringing up of the edges of the blades is one of the most important of the printer's duties and it requires long experience and constant vigilance to preserve this part of the equipment at a high state of effectiveness throughout long printing runs.

The two main types of blade are:—(1) the cleaning blade—usually of hard steel —of which the following types are examples: vanadium steel, blue steel, and silver steel; (2) the "lint" blade, of which the following types are examples:—brass, and phosphor bronze.

At all stages close observation of the condition and functioning of the doctor blade is essential, and where keen attention is given, good results will follow. The two main factors are:—(1) an absolutely straight edge; (2) a very keen edge. bevelled on one side only.

Full instructions are given for sharpening the blades, and for their proper adjustment in the printing machine, at the correct angle and with the right amount of weight.—W.H.C.

Some Effects of the Evaporation of Water from Cotton Cellulose

W. A. Bone nad H. A. Turner, *J. Soc. Dyers and Colourists* **66**, 315-27, June, 1950.

Experiments with purified cellulose, air and water indicate that an increased activity of the system is shown at the so-called "water-line". This is the narrow boundary region between wet and dry cloth which is formed when a strip of bleached cloth is suspended vertically with

its lower end dipping in water for a considerable period. Evidence is brought forward to show that the cotton cellulose is modified at the water-line to give two distinct types of product—one, soluble and transportable in water, brown in color, markedly fluorescent in ultra-violet radiation, with enhanced reducing properties; the other, solid, nontransportable in water, restricted to the boundary region, with higher cuprammonium fluidity and Methylene Blue absorption than the original cellulose. The action is not originated, nor does it seem to be greatly affected, by light energy. Wide variations in the partial pressure of oxygen in the surrounding atmosphere cause little change in the apparent intensity of the brown line. Both undyed and vat-dyed cotton was used in these experiments, which are described in great detail.—W.H.C.

NEW ENGLAND INDUSTRIAL WASTES CONFERENCE

IN COOPERATION with the New England Council and the New England Sewage Works Association, the Department of Civil and Sanitary Engineering of the Massachusetts Institute of Technology was host to a New England Industrial Waste Conference on June 26, 27 and 28. Designed to consider the increasingly acute problem of stream pollution by industrial wastes, the conference served to bring together three groups for discussion of control problems and processes for treating industrial wastes: industrialists, representing management, chemical engineers and sanitary engineers; representatives of stream pollution and water control agencies on the federal, regional and state levels; research workers and consulting engineers concerned with the processing of industrial wastes and water supply problems. In addition to general discussions of pollution abatement from the viewpoints of industry, control agencies and municipalities, there were symposia on the water and waste problems of specific New England industries and a special discussion of future needs and developments.

In the symposium on textiles on June 27th three papers were presented, abstracts of which follow:

Treatment of Wool Dyeing and Finishing Wastes

M. G. Burford, Head, Department of Chemistry, and J. W. Masselli, Research Chemist, Wesleyan University.

One of the pressing problems of industrial wastes in New England is that of the relatively small textile mill. A concentrated effort should be made to find a treatment plant design which will solve this problem at a cost which can be met by the small mill when incorporation of the wastes into municipal sewerage lines is not possible.

In this connection, the results of a thorough survey of one such plant in Connecticut were discussed. Consideration was given of the pollution load contributed by the various wastes, and of the feasibility of excluding relatively pure rinse waters from treatment. Results of screening and filtration experiments and pilot plant tests were given. Coagulation experiments with alum have shown 70-80 per cent reduction in B.O.D. with sludge deposits of 2-4 per cent. Other possibilities were considered briefly.

Waste Treatment in Cotton Finishing Plants

George C. Bogren, Partner, Weston and Sampson, Boston, Mass.

This paper dealt primarily with the treatment of combined wastes from cotton finishing processes, rather than the separate components. The component wastes vary in pH from 1.5 to 12.0, and in B.O.D. from 2 to 7,000. The combined wastes generally have a pH of 9.0 to 10.0, and a B.O.D. somewhat less than domestic sewage. They contain many chemicals inhibitory to biological life—sulfuric acid, caustic soda, sodium hypochlorite, sodium peroxide, and others. Many of the component wastes are light enough to require no treatment.

The most practical method of treatment is the high-rate biological trickling filter, with or without chemical preneutralization, because of its relatively low operating cost and its ability to withstand wide variations in character of applied wastes without serious loss of efficiency. Chemical coagulation and clarification generally are relatively expensive, due to the constant skilled attendance required and the cost of chemicals. No method of treatment should be adopted without pilot-plant experimentation.

Recovery of Grease From Wool Scouring Wastes

Alexander A. Cameron, Vice President, Abbot Worsted Co.

Scouring of high grease content wools at Forge Village, Mass., has necessitated the treatment of the wastes in order to eliminate the pollution in the discharge stream. For this purpose the Calcium Hypochlorite Treatment Process was adopted. Two hundred thousand gallons of scouring waste water per week are treated with 6 to 7 per cent by volume of calcium hypochlorite. After thorough mixing and settling the sludge is drawn off and treated with sulfuric acid to a pH of approximately 4.5 and allowed to settle. The clear liquor is decanted to the stream while the sludge is heated and pumped to a blowdown tank. It is then forced through Sperry filter presses. The grease that is recovered is sold. The process will pay if the price of degras is about ten cents per pound and wools of high grease content are scoured. Attempts have been made to extract grease from the cake but have been unsuccessful.

The treatment process has been very satisfactory. The average B.O.D. removal has been 70 to 75 per cent. Objectionable conditions have been removed from the stream and it is again well stocked with fish.

OBSERVATIONS ON THE ANOMALOUS LIGHT FASTNESS OF SOME DYED TEXTILES*

PHILIP WALTER SMITH

James Hardcastle & Co., Ltd., Bradshaw Works, Bolton, Lancashire, England

The anomalous behavior of certain direct and vat dyes on exposure to light under varying conditions is discussed, and the effect of crease-resisting resins of the urea-formaldehyde type on dyeings made with direct cotton, vat, and azoic dyes is reviewed.

WHEN general consideration is being given to the whole subject of the fading of dyed textiles, the practical man must necessarily be at a disadvantage against those whose concern is with the presentation of papers of a theoretical nature. For the most part, the observed phenomena are straightforward and easily repeatable, but often very difficult of explanation, particularly when dyes closely allied in structure and similar in shade show wide variations in light fastness.

In presenting a paper devoted to those cases where dyes vary from their normal behavior when exposed to light, no excuse is made therefore for not attempting to explain the various anomalies. Further, such a paper cannot be a model of close reasoning, step by step, but must be largely a series of unrelated observations. Nonetheless, it is important that such an occasion as this symposium should not pass without consideration of some of the problems of practice—both explained and, as yet, unexplained. It is hoped, further, that the subsequent discussion may increase the range of the paper and so leave with our more theoretically minded colleagues a few of the bothersome features of present practice.

Before any question of the "anomalous" behavior to light of any dye or dye mixture can arise, it is first necessary to define the "normal" light fastness of the compound or combination. This will usually refer to a correctly dyed shade on the fiber most commonly used for the dye.

That the substrate can be a most vitally important factor is readily seen in the varying light fastness figures exhibited by acetate rayon dyes on cellulose acetate rayon itself and on nylon fiber, while an older and better known illustration is found with direct dyes when dyed on viscose rayon undelustered and delustered with titanium dioxide.

The astonishing changes and variations which can be obtained with vat dyes on nylon fiber when the method of dyeing and the aftertreatment are varied provide ample evidence of the importance of correct dyeing and distribution of dye through the fiber.

With direct cotton dyes, a correctly dyed shade on cotton or viscose rayon is usually regarded as fixed and well defined, but it is possible under certain conditions to obtain a degree of fading which is more severe than is normally expected. In extreme cases, the accelerated fading is so rapid that a loss in depth is obtained in a few hours which, under ordinary circumstances, would require several months' exposure. The presence of titanium dioxide as a delustrant in viscose rayon has already keen noted as one factor, while others which are known to increase the rate of fading are moisture and the action of one dye on another. Moisture alone on viscose rayon dyed with a homogeneous dye does not affect the light fastness of the majority of direct dyes to any serious extent. However, in combination with the other factors, moisture can produce an effect on the rate of fading of some dyes which can be very considerable. Thus—

Chrysophenine GS (*C.I.* 365)
Chlorazol Fast Red FS (*C.I.* 419)
Durazol Violet 2BS (ICI)
Durazol Blue 2GNS (ICI)

when exposed to light on delustered viscose rayon in a wet state all show an appreciable decrease in light fastness, while the effect on, say, Durazol Helio BS and Durazol Blue GS is very much less.

The effect of one dye on another when exposure is made under moist or wet conditions is well exhibited with dyes of the Durazol Yellow GS and Durazol Yellow GRS type when dyed in combination with certain other direct dyes. Green shades produced with Durazol Blue 2GNS or Durazol Violet 2BS and one or other of the above yellows show anomalous light fastness in that the combination "fades" yellow much more rapidly than would be expected. Other dyes which are affected to a lesser extent, but even so should be avoided in combination with Durazol Yellow GS or GRS, are—

Durazol Scarlet 2GS
Durazol Brown 8RS
Durazol Brown BRS
Durazol Grey VGS

all of which (except Durazol Scarlet 2GS), together with Durazol Blue 2GNS and Durazol Violet 2BS, are copper-containing dyes. None of these products shows any unexpected behavior, however, when dyed in combination with Durazol Flavine RS or Durazol Yellow 6GS.

Some indication of the reasons for the above behavior may be provided by stating that if any of the sensitive combinations are exposed to light in the presence of small amounts of such an oxidizing agent as sodium perborate or percarbonate, greatly accelerated fading will also occur.

In the field of vat dyes, green shades produced with certain dye combinations again demonstrate unexpected behavior. Caledon Jade Green XNS (ICI) is well known to be among the vat dyes classed as of the highest order of light fastness, while the weakest part of the vat range from a light-fastness point of view lies in the very bright greenish yellows, where neither Caledon Yellow 5GS nor Caledon Yellow 5GKS is remarkable for high light fastness; and yet lime-green shades produced on either cotton or viscose rayon with Jade Green and either of these yellows fade yellower in shade, instead of bluer as would be expected. Both of the yellows concerned are known to be tenderers of cellulose on exposure to light, and similar anomalous behavior with Jade Green is found when other tendering dyes, such as Caledon Orange 2RTS and Caledon Orange 4RS, are dyed in combination with it. Whether the yel-

* Presented at Symposium on Photochemistry in Relation to Textiles of Society of Dyers and Colourists, September 22-24, 1949. Reprinted from their Journal, December, 1949.

low or orange is a tenderer or not is not the whole story, however, as Caledon Golden Yellow GKPS behaves normally in conjunction with Jade Green despite being classed as a tendering dye. The phenomenon is, however, most commonly found with the tenderers, but the exact relationship between tendering and accelerated fading of Caledon Jade Green is not clear.

Those dyers and finishers who cater for trades in which the Tootal Broadhurst Lee Co. Ltd. crease-resisting process (involving the use of urea-formaldehyde resins) is used have been aware for many years of the disastrous effect of the process on the light fastness of most fast-to-light direct cotton blues. While not all blues are affected, it is not easy to give satisfactory explanations why Durazol Blue 2GNS and Solor Blue F (S) should be satisfactory while Durazol Blue GS and similar types are so heavily reduced in their resistance to light fading.

The whole behavior of direct cotton dyes to crease-resisting is baffling, as the light fastness of some members, particularly those in the yellow portion of the range, is actually increased, while that of others suffers a drop. Among those which are adversely affected are a very high proportion of the dyes which normally attain a high degree of light fastness.

Those direct cotton dyes which are normally diazotized and developed with β-naphthol or *m*-phenylenediamine to give enhanced washing fastness are usually of poor or moderate light fastness, but in almost all cases show an increase of 1 or 2 on the S.D.C. scale (*B.S.* 1006) after undergoing crease-resisting. Here, again, it is not easy to state why such an increase should be so common when azo dyes of very similar structure which are not aftertreated on the fiber are not similarly advantageously affected.

With Brenthols (ICI) the general rule is opposite to that observed with direct cotton dyes. All azoic combinations are not equally affected nor does any one Brenthol or Brentamine Fast (ICI) dye base or salt show consistency of behavior, but the trend in all cases is for the light fastness to be improved. The yellow combinations obtained from Brenthol AT with Brentamine Fast Red KB and Brentamine Fast Scarlet GG respectively are both appreciably faster to light after crease-resisting, whereas the same Brenthol coupled with Brentamine Fast Orange GR or Brentamine Fast Red B is but slightly altered. A change of Brenthol to the red-producing Brenthol BA gives a combination with Brenthol Fast Scarlet GG which is unaffected in light fastness by crease-resisting, whereas the combination with Brentamine Fast Red B is enhanced in its fastness to light.

For those who are commercially interested in the combination of azoic dyes with the crease-resisting process, a study of each individual combination of Brenthol and base will yield an almost complete range of azoic combinations with improved light fastness. Although these combinations can be ascertained at the present time only by trial and error, such are the variations in light fastness improvement from combination to combination that this range of dyes might well be a fruitful starting point for a theoretical study of this problem.

Of the other ranges of dyes used for the dyeing of cellulosic fibers, the vat dyes are the most important. Here, again, the reaction of individual dyes to crease-resisting cannot be forecast, but the position is less complicated in that a very large number of the compounds concerned are not materially affected. Yellows, again, are improved, Caledon Yellow 5GS markedly so. Another outstanding improvement is found with Durindone Blue 4BCS (*C.I.* 1184), but no change can be observed with such products as Caledon Yellow GNS and Durindone Brown GS (ICI) when dyed on to cellulose separately. Particular mention is made of these two dyes, however, as their use in combination is frequent in the textile printing trade for the production of all types of old gold, ochre, and yellowish-brown tones. When shades so produced are subsequently crease-resisted, the fastness to light can be rated at little greater than zero, particularly with the predominantly yellow shades. Exposure to sunlight produces a noticeable darkening of shade in a matter of a few minutes. That the phenomenon is phototropic is shown by keeping the exposed and dulled material in the dark for some time, when the original and true shade is restored. Even so, it is alarming and surprising that two dyes which are individually so satisfactory should show such peculiarities when used together.

Other vat yellows are not so grossly affected as is Caledon Yellow GNS when mixed with Durindone Brown GS, although the effect is not entirely absent.

The various effects obtained with the crease-resisting process have been dealt with at some length, both for their intrinsic interest and as a warning of the care which must be exercised with resins in conjunction with what may be fast ranges of prints or dyes. With modern developments in resins for the textile industry and their possible future use for such desirable features as dimensional stability, care must be taken that fastness figures are not drastically reduced.

For the time being, the dyer and printer can only test each individual and combination. They can, however, express the hope and the wish that the physicists and physical chemists will help them in their desire to be on surer ground when dealing with such oddities of light fastness behavior.

DISCUSSION

A. M. Elborai: The lecturer has referred to the general inferiority of vat and Indigosol prints on nylon in respect of light fastness, and has shown how this is often improved on rayon when a urea-formaldehyde anticrease finish has been given. Is he aware of the suggestion that has been made (*Amer. Dyestuff Reptr.*, 1949, *38*, P564) that improvement in light fastness may be effected on both classes of dyeings by a steaming process under superatmospheric pressure in an operation of 20-60 min. after the dyes have been developd in the ordinary way (wet or steam)? Does his own experience confirm the value of this suggestion?

G. S. J. White: The effect of steaming on such dyed nylon materials is due to aggregation, which, while beneficial as far as light fastness is concerned, tends to introduce other deficiencies, e.g. poor rubbing fastness.

K. Lowit: Has the speaker or anybody present compared the light fastness of vat colors printed by the Formosul process with vat colors fixed to the fiber by resins or by cellulose acetate? Has the method of fixation any influence on the tendering of cellulose?

R. J. Hannay: Referring to the point raised by Mr. Lowit regarding the fastness of vat dyes when applied as pigments in a medium such as cellulose acetate to textiles, it is obvious that we are dealing with a very complicated system in this case. While it might be argued that such a method should give rise to increased light fastness, and in the case of dyes which cause tendering to a lower degree of attack, because the dye is in a state of higher aggregation and because the particles of dye are enveloped in a film of cellulose acetate, it is really not logical to accept this without much further investigation. Many points would require determination such as the form of vat pigment used, ordinary powder, highly dispersed powder, or aqueous pastes, the type of cellulose acetate used, primary triacetate or secondary acetate and the degree of acetylation, the type of solvent used, whether polar or nonpolar and if polar whether slightly or strongly polar. It is generally true to say in the case cited by Mr. Lowit that secondary acetates with a comparatively low acetate content are employed, and polar solvents having a high water tolerance are used, but a further factor is the efficiency with which the vat pigment is incorporated into the medium, which in turn is influenced by the choice of dry pigment or aqueous paste. It is therefore very obvious that before a definite answer could be given

to Mr. Lowit's question many of the foregoing points would have to be settled, and that if an answer was obtained by experiment and observation, it might possibly be true only for the strictly defined conditions under which the observations were made. It is known, however, by the speaker that the tendering effect of titanium dioxide when applied to cotton or viscose by the above process does not appear to be in any way reduced, from the point of view of the practical printer.

Dr. J. F. Gaunt: Although this paper deals only with the light fastness of cellulosic fibers, the following unusual behavior of certain wool dyes is of interest—

(1) Unless a strong acid, e.g., sulfuric acid, is present in the dyebath when dyeing Solway Sky Blue BS the maximum light fastness of this dye is not produced. The explanation of this appears to have never been published, but there is some evidence that the decrease in light fastness is associated with the hardness of the water used in dyeing.

(2) Certain dyes generally applied to other fibers, e.g., cotton or acetate rayon, can be used on wool, but often exhibit different light fastness on the various fibers. For example, Chlorazol Fast Red FS when dyed on wool by the afterchrome or metachrome process has considerably better light fastness than when dyed on cotton. Certain of the Solacet series are inferior in light fastness when dyed on wool as compared with the same dye on acetate rayon.

(3) If wool is treated with a solution of nitrous acid of the concentration used for developing Indigosol (Soledon) dyes, the color of the wool is at first very pale straw, but on exposure to light it becomes progressively more yellowish brown. This may be the explanation for the peculiar change in color of dyes of this type when dyed on wool and developed by the nitrite method, and similar behavior is to be expected when dyeing diazotized and developed colors on wool-cotton unions. Presumably the coloration arises in the first place from nitrozation of the tyrosine residues in wool.

E. Marney: With reference to the query raised by Dr. Gaunt relative to the effect of nitrous acid on the Standard 7 (Soledon Blue 4BC), in my experience it is extremely difficult to get complete development of this dye on wool by the nitrite method, and the result of inadequate chemical development is anomalous light fastness in that the under-developed dyeing is photodeveloped and actually becomes more intense before any fading takes place. This effect is not observed with a bichrome development.

In connection with anomalous resistance to light, in some recent wet fading tests carried out with a variety of dyes, one pattern was exposed in the ordinary way in the fading lamp, and a second pattern was exposed to the same light but at the same time this second pattern was kept continuously moist by capillary wetting of the *back* of the pattern from a piece of wet wool. Constant evaporation of water took place, of course, from the *face* of this second pattern. The effect with Caledon Yellow GN was of interest, since it was seen that the same type of greening on exposure was apparent in both patterns, although the second pattern presumably had a flow of air-containing water passing through it. In other cases, particularly azoics, the effect was for the fade to appear *through* the cloth, as opposed to the normal surface effect on the normally exposed pattern. With direct dyes of poor water resistance the effect with the wetted pattern was a more intense *face* of the pattern and a "faded" back. This was, of course, primarily due to swealing.

In all cases considered, more severe fading, and in some cases considerably more fading, was observed with the wetted pattern, as compared with the effect of the simultaneously exposed dry pattern.

H. W. Partridge: With reference to the remarks of Mr. Marney it may be of interest to record our own observations on the effect of light on wet textile materials. On certain occasions we have been asked to investigate the cause of abnormal fading of both viscose rayon and cotton hose dyed with direct dyes of normally satisfactory fastness. We have found it possible to reproduce the effect exactly by exposing such materials in a wet condition to direct sunlight. Under such conditions fading, almost to the point of bleaching, occurred within an hour, the rate of fading being greatest just before the material dried out.

E. Wilson: Other examples of anomalous light fastness that can be mentioned are—

(1) Chlorazol Fast Red K and Pink BK are approximately equal in the original type of Fade-Ometer, but the former is superior in English daylight.

(2) Diamine Brilliant Scarlet S and Direct Fast Scarlet SE again are approximately equal in the Fade-Ometer, but the former is very fugitive in daylight.

(3) With Solway Rubinole R and Lissamine Fast Red B, the order of fastness is reversed as between Fade-Ometer and English daylight.

(4) *"Wet" Fading*—Many sulfur browns and yellows are considerably less fast when exposed "wet" as compared with "dry" conditions. Hydron Olive G is an example in vat dyes. Such fastness property is important for fabrics liable to be exposed wet, and all dyes should be tested accordingly.

Dr. E. I. Stearns: We are all too prone to consider light fastness as a property of a dye, something we can look up in a dyestuff shade card and express as a number. Actually light fastness is the property of a system, of the combination of dye and substrate. From this viewpoint much dye behavior is not anomalous. A crease-resistant treatment produces a new system, and this new system should not be expected to have the same light fastness as the untreated dye-substrate system. Calling a different fastness on cotton and on wool an anomaly is a conclusion based on the false premise that fastness is the independent property of a dye.

Dr. C. A. Muhr: Anticrease finish has generally an improving effect on the light fastness of direct dyes of lower light fastness and lowers the light fastness of dyeings of high light fastness.

The softeners in the precondensate play an important role. Thiourea gives generally better light fastness.

For getting the best light fastness it is necessary to soap the fabrics after anticrease finishing.

Dr. Smith: With regard to the first part of the question, there seem to be no general grounds for stating that dyes of low light fastness improve and those of high fastness deteriorate on anticreasing. This may be generally true with direct dyes, but with vats and azoics the tendency is for improvement in all cases.

Thiourea may be preferred to urea so far as light fastness is concerned, but price rules out the sulfur product in commerce.

K. A. Hilton:* The behavior of dyes as regards the effect of crease-resist finish on light fastness has been termed by the author "baffling". No attention appears to have been given to the behavior of a urea-formaldehyde resin on exposure to light. Is it not possible that on exposure to light and air, the resin may break down to yield small quantities of formaldehyde or other reducing substances? A dyeing of Caledon Yellow G treated with a urea-formaldehyde precondensate and dried (not baked) will be found to change to a green on exposure to light more rapidly than an untreated dyeing. Mr. Scholefield, Mr. Hannay, and others have suggested, during this Symposium, that fading may be connected with a light-sensitized reduction-oxidation cycle, viz. a preliminary reduction or activation of the dye followed by attack by active oxygen. The presence of reducing substances in the system may have considerable effect on such a cycle. For example, the reducing substances from the resin may be oxidized in preference to the dye and hence the fading of the dye diminished.

E. E. Bowker: In relation to the effect of steaming upon the light fastness of vat dyes upon nylon it should be noted that the light fastness is improved by steaming only if this process is conducted under increased pressure (1.5-2 atm.). This treat-

* Communicated.

ment is carried out with the oxidized vat dye within the nylon, and it should here be pointed out that the oxidation is much more difficult on nylon than upon cellulosic fibers, and that incomplete oxidation is itself detrimental to light fastness. Within the molecularly closely packed and highly oriented fiber the finely dispersed vat dye particles are unable to aggregate to the same extent as they do within cellulosic fibers, and the effect of the pressure steaming treatment is to swell the nylon and allow this aggregation of vat dye particles to take place. The light fastness after aggregation more nearly approximates to that of the same dyes upon cellulosic fibers.

That particle size does play a part in the light fastness can further be illustrated by applying a suspension of a vat dye to nylon in the presence of a swelling agent.

The light fastness of a "dyeing" prepared in such a manner (where there has been no possibility of breakdown of the dye aggregates to molecular proportions as during the normal "leuco" dyeing method) is much superior to that of the same dye applied by normal methods.

The examples given by Dr. Smith of azoic combinations which are improved by the crease-resist process may possibly be individual examples of the well known effect on particle size of azoic dyes upon light fastness. The conditions of the crease-resist process may be such that certain azoic combinations are aggregated sufficiently to affect the light fastness. [As an illustration of the effect of particle size upon light fastness, two photomicrographs illustrated the result of a steaming process under pressure upon an azoic dyeing on viscose rayon].

The light fastness of the normal dyeing, where no pigment particles are visible, is 5-6 on the S.D.C. scale, while the fastness of the dyeing after the steaming process is 7.

In the above example it is not claimed that particle size of the pigment is the only variable affected by the steaming process. For example, the water imbibition will be altered, as will the pigment concentration, as some of the surface aggregates are removed by rinsing, but the example illustrates the suggestion that particle size can affect light fastness.

H. R. Hadfield: With regard to the observations made by Mr. Bowker concerning azoic combinations on viscose rayon, we have shown that, with certain azoic combinations, prolonged soaping under pressure causes aggregation of the pigment and also migration of the pigment to the fiber surface. In extreme cases, this last effect is so pronounced that the resultant dyeing is practically colorless, due to extraction of the pigment from the fiber by the dispersing solution.

It has been observed that an alkaline leuco vat dye is dichroic on viscose rayon, but when the dyeing is oxidized and soaped the dichroism is removed. The dichroism of the reduced vat dyeing is caused by the orientation of the dye molecules by the orientated cellulosic chains. Oxidation and soaping destroy the intimate contact between fiber and dye and also cause aggregation of the dye molecules: they are no longer orientated, and the dyeing no longer shows dichroic properties. If the experiment is repeated on nylon, the results show an important difference; for, even after oxidation and soaping, the dyed nylon is still strongly dichroic. This observation shows that the oxidized vat dye is in intimate contact with the nylon and is probably in a finely dispersed condition, a conclusion agreeing with that of previous speakers.

R. J. Hannay: It is quite possible that some of the anomalous results encountered in practice may be due to processing differences in the works. In the case of vat dyes incomplete reoxidation or development of the dye can have a marked effect on lowering the light fastness of the dye in some cases, and slight differences from batch to batch in the various oxidation and soaping processes might easily give rise to some of the apparently contradictory results encountered in subsequent use of the materials.

S. R. Cockett: The combination of dyes of high light fastness with fluorescent compounds can give rise to unsatisfactory results. Such compounds are now present in domestic soap powders, and in addition to their affecting the depth of pale shades of the complementary color, giving an apparently poor washing fastness, a laundered fabric may be unevenly dyed with a combination of vat dye and fluorescent compound. Since the light fastnesses of the two are hardly comparable, the fast dye may appear to fade on exposure.

S. Burgess: Dr. Smith mentions a number of dyes which should not be used in combination with dyes of the Durazol Yellow GS or GRS type. It may be worth noting that some years ago we found that an I.G. dye, formerly known as Benzo Fast Light Scarlet 4BL and later as Sirius Supra Scarlet B, was eminently suited for mixing with this type of yellow. It does not appear to be commercially available at present.

• PATENT DIGEST •

WATER REPELLENT FABRICS — Methylomelamines and Fatty Acid Methylolamides —Strongly Acid Condensation

G, 2, 02

U. S. Pat. 2,505,649

(Du Pont—Pikl—April 25, 1950)

PAUL WENGRAF

This specification refers to U. S. Pat. 2,357,273 (1943)—see below—describing the use of dispersions of methylated methylol-melamines and higher fatty acid N-methylolmelamides as water repellents. This reaction depends on the use of acid catalysts and especially weak acids. In the present patent the effect is said to be not sufficiently durable. In contrast, the use of like combinations of methylolmelamines with methylolstearamide under controlled reaction's conditions is proposed. Principally, the condensates have to contain nonreacted methylol- or methylol ether groups capable of reacting further with a tertiary amine, preferably a pyridine salt. The specification offers an explanation of this reaction: it is assumed that by condensing the aforementioned components in presence of a substantial amount of HCl the methylolstearamide reacts only partly with methylolmelamine while the remaining part is converted to methylene distearamide. On the other hand, nonreacted methylolmelamine is converted to a resin while some free methylolgroups (still unchanged) convert the tertiary amine salt, i.e., pyridine chloride, to the quaternary pyridinium compound.

The main innovation is in the application of strongly acid media, whereby formaldehyde is eliminated and methylene amides are formed. These methylene links appear to be more stable and to improve the durability of the water repellent effect. The amount of hydrochloric acid is within the limits of 0.5—4 mols HCl per mol methylol melamine. In one of the examples an isopropanol solution of hydrochloric acid is heated with partially polymerized methylolmelamine to obtain

the corresponding isopropylether. Some more HCl and flaked methylolstearamide are added. The reaction's mass, a viscous product, is mixed with Pyridine. Later, stearamido methylene pyridinium salt (i.e., Zelan) is added as a dispersing agent. Cotton cloth, padded in an aqueous dispersion of the final product is dried and baked at 175°C. The water repellent effect is said to resist well to washing and especially to dry cleaning operations.

References cited by the Patent Office:

U. S. Pat. 2,321,586 (1943—General Electric): methylolmelamines reacted with halogenated acetamides, used as laminating agents for sizing cloth, making them resistant to fire, heat and water and imparting the material dielectric properties.

U. S. Pat. 2,357,273 (1944—American Cyanamid): a composition of low alkylated methylol melamines, mixed with high substituted amides or compounds of the urea class. Examples are: methylolstearamide, methylol lauramide, methylol stearoyl urea, etc. The purpose is to make textiles water repellent (see above).

Reference is further made to U. S. Pat. 2,491,249 (1950—Cyanamid), REPORTER 1950, 267, which recommends condensations of the above mentioned components (methylolmelamine + methylolstearamide) in alkaline media in contrast to the strongly acid condensation, which is protected by the present patent.

INHIBITED STARCH D, 1

U. S. Pat. 2,500,950
(National Starch Products, Inc.—Konigsberg—March 21, 1950).

The term "inhibited starch" indicates a transformed product which upon cooking gives salve-like, more cohesive pastes in contradistinction to normal starch which produces, under the same conditions, a rubbery cohesive mass. The inventor refers to U. S. Pat. 2,317,752 (Fuller-assigned to the same company) protecting treating starch with hypochlorite or chlorine yielding agents and a "modifier" which may quite generally be of inorganic or organic aliphatic or aromatic nature (e.g., acetamide, urea, sulfamates, vegetable or animal proteins). The present specification states that these products lose their property of forming noncohesive starch pastes through cooking in the presence of alkalis. It has been observed that "inhibited" starch, which preserves this property *even in alkaline treatments,* can be produced by reacting the ungelatinized starch with an ether forming reagent. Examples are propylene dichloride, glycerol dichlorohydrin, epichlorohydrin and so on. It is assumed that these compounds react with two OH groups present in the starch molecule. The reaction is promoted under alkaline conditions but the alkalinity must not be great enough to effect gelatinization. Sodium sulfate added to the starch has the effect of counteracting the gelatinizing effect of free alkalis.

In one of the examples Tapioca starch is suspended in highly diluted soda lye and epichlorohydrin is added while stirring is continued at room temperature for about 15 hours. The alkali is then neutralized and the starch filtered, washed and dried. A noncohesive paste is obtained by cooking one p. of this starch in 15 p. water. Addition of several percent NaOH causes swelling but does not destroy the salve-like character of this composition. The products can be used in the food industry as well as in preparing printing thickeners, etc.

References cited by the Patent Office, among others:

U. S. Pat. 2,148,951 (1936—Du Pont): starch reacted with bifunctional agents i.e., compounds capable of condensing two groups with two OH groups of the starch (e.g., epichlorohydrin or dichlorodiethylether) in presence of alkalis.

U. S. Pat. 2,116,867 (1938—Du Pont): starch reacted with alkylating agents, such as dimethylsulfate, under alkaline conditions. These processes differ from the method discussed here in that the reaction is carried out on pregelatinized products.

CREASEPROOFING TEXTILES —Mixtures of Methylated and Nonmethylated Methylolmelamines. G, 2, 04

U. S. Pat. 2,504,857
(Jos. Bancroft & Sons—McIntyre—April 18, 1950).

The amount of crease-resistance obtained by applying the usual resin precondensates (termed here as "partially polymerized or Stage A resins") is generally proportional to the concentration of the resin solution. It has been observed that the loss in tear strength increases with the concentration of solids. The present invention tends to obtain a maximum creaseproofing effect without unduly impairing the fiber strength. Various melamine-formaldehyde condensates (methylolmelamines) or methyl ethers thereof used in form of their precondensates have been proposed for this purpose. The maximum number of methylolgroups linked to the melamine ring is 6. It has been found that a mixture of methylated and nonmethylated methylolmelamines has the surprising effect of giving either greater crease resistance with less loss of tensile strength or normal crease resistance by using smaller concentrations of these mixed melamine precondensates. The ratio of methylated methylolmelamines to nonmethylated ones can be between 80 : 20 and 20 : 80. Generally, 50 : 50 ratio seems to give optimal crease resistance and at the same time a maximum tensile strength. It is said that the concentration of the solution is not critical. A solution of 3-20% solid content will be sufficient provided the pick-up is adjusted to 100%. Di-, tri- or tetramethylolmelamine may be used in combination with methylated (etherified) products, exhibiting at least one nonetherified methylolgroup. Curing is effected at 240°F. in 15 min. or at 260-380°F. in 30 sec. to 5 min. These finishes can be combined with various finishing operations (calendering or frictioning). Small amounts of acid catalysts are added to the impregnating bath (e.g., phenylbiguanide chloride, diammonium phosphate and the like). Addition of softening agents (quaternary ammonium salts) or small quantities of urea (as buffering agents for formaldehyde, possibly released in this process) is further recommended. An example calls for the application of a solution of 28 lbs. dimethylolmelamine (100%), 35 lbs. dimethyl trimethylol melamine (80%), 40 lbs. high substituted quaternary ammonium salt and 3 lbs. dimonoethanolamine hydrogen phosphate (as a catalyst) in 800 lbs. water. The fabrics are dried on a loop drier, cured for 5 minutes at 290°F. in a loop ager, washed with dilute soda ash, rinsed and dried.

References cited by the Patent Office, among others:

U. S. Pat. 2,350,139 (1944—Ciba); treating textile fibers with triazine—aldehyde condensates, which may be hardened at temperatures above 100°C. Quaternary ammonium salts of the Sapamine KW type are added to obtain a creaseproofing as well as a water repellent effect.

U. S. Pat. 2,339,203 (1944—American Cyanamid): shrinkproofing textiles with methylated methylolmelamines cured in presence of an acid catalyst. Concentration is about 2-14%.

U. S. Pat. 2,197,357 (1940—Ciba): melamine-formaldehyde, alkylated simultaneously with alcohols, glycols or the like.

Brit. P. 466,015 (1937—Ciba): treating textiles with a condensate of melamine-formaldehyde containing at least one replaceable hydrogen; softening and delustering effects are claimed.

Reference is further made to U. S. Pat. 2,454,078 (Du Pont) comprising creaseproofing with etherified methylolmelamines (REPORTER 1949, 326).

Methylolmelamines reacted with substituted tertiary nitrogenous bases to form condensates for creaseproofing purposes have been described in U. S. Pat. 2,420,157 (American Cyanamid)—see REPORTER 1947, 578.

The examples of the present specification suggest in contrast the addition of preformed substituted quaternary ammonium salts to the finishing solution.

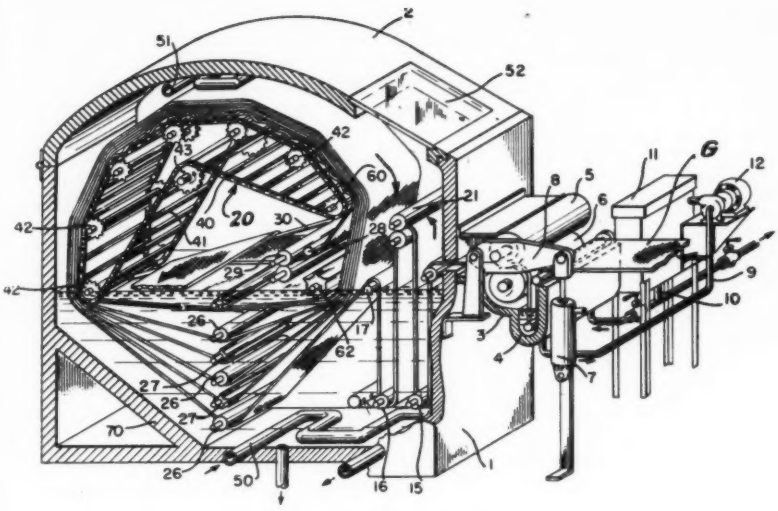

Figure 1—U.S.P. 2,505,657

DYEING APPARATUS—Impregnating Device Combined With Developing Chamber. C, 6

U. S. Pat. 2,505,657
(Du Pont—Wentz—April 25, 1950).

This patent refers to a co-pending application, now U. S. Pat. 2,369,696 (1945)—see references here below—protecting a continuous dyeing (also bleaching or finishing) machine in which the fabrics are led in a multiple of laps around slated reels or drums. The amount of treating liquid, contained in a closed chamber, is reduced to a minimum while the goods are passed many times through the same bath before leaving the chamber. It is emphasized that generally this construction proves to work in a satisfactory way except where extremely wide fabrics have to be treated or where the treating time would have to be extended for such a long period that too many reels would be required. In this event the machine would be of such proportions that this construction becomes impractical. Moreover when very heavy goods have to be treated there is a tendency for the loose folds to drop back, interfering with their equal distribution. These problems are solved, according to the present invention, by providing a continuous belt carrying the innermost loose laps, which are pushed forwards while new layers are continuously wrapped around this conveyor belt. According to Fig. 1 the goods (G) are padded in (3) with the dyebath (or other treating solution), squeezed by rollers (5 and 6) and led into chamber (1). The liquid in the padder (3) can be circulated from tank (11) by the pump (12). The fabrics are thereupon immersed in the after-treating solution by passing under rolls (15, 16) and wound around the belt (20), which is composed of chains (40), cross-slats (41) and drums, by means of sprocket wheels (42 and 43). It can be seen from Fig. 1 that while the laps are running tightly one around the other in the upper part of the machine, they are carried in separate layers (rollers 26 and 27) through the aftertreating liquid, effecting sufficient penetration and at the same time economy of space. The driving mechanism of conveyor (20) can best be seen in Fig. 2. Finally the innermost fabrics layer is withdrawn through squeeze rolls (29) and about the 45° take-off bar (30) wherefrom the goods pass out in a horizontal plane (Figs. 1 and 2). A modified construction, adapted for dyeing loose material, slubs, sliver, tops, etc. is shown in Fig. 3. This material is inserted at (102) between belts (100 and 101) and then otherwise treated in an analogous way. Although the method might first have been intended for developing dyeings (vats, chrome dyes, indigosols, etc.), any processing of fabrics requiring a two-step treatment such as bleaching or finishing is within the scope of this invention.

References cited by the Patent Office, among others:

U. S. Pat. 2,369,696 (1945—Wentz—Du Pont)—the co-pending patent: a continuous dyeing machine characterized by the fabrics to be treated being led in a multiple of wraps to prolongate the after treating time. The goods are withdrawn finally by a roll forming an angle of 45° with the last pair of squeezing rolls.

U. S. Pat. 2,366,100 (1944—Green): a dyeing machine wherein the cloth impregnated with the concentrated dye liquid can be kept for a longer time in a booster. The fabric is run in spirals and withdrawn by a top roll forming an angle of 45° with the last feeding roll of the booster.

U. S. P. 1,123,768 (1915—Lewis-Sayles): a cloth piling apparatus for dyeing purposes, comprising a drum and an endless apron extending partly around the flanges of the drum. A storage chamber is formed

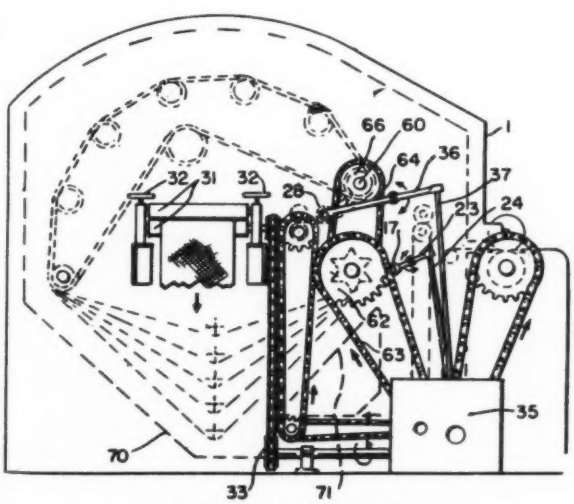

Figure 2—U.S.P. 2,505,657

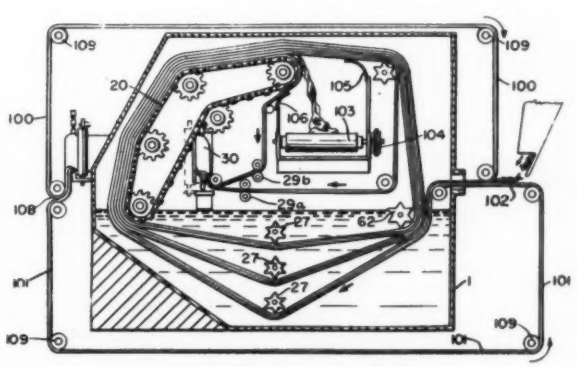

Figure 3—U.S.P. 2,505,657

in which the fabric is piled up, treated with a dyebath or bleaching liquid and gradually withdrawn.

Cf. also the recently published digest to U. S. Pat. 2,501,480 (Botany Worsted Mills)—REPORTER 1950, 467.

SCREEN PRINTING APPARATUS D, 4

Brit. P. 637,812

(Heintges, Jacobs & Co.—Lindahl—May 24, 1950).

This patent suggests a method of applying the printing paste through stencils on strips of fabrics laterally, i.e., in a right angle to the warp direction, in contrast to the usual way of spreading the color in the direction of the warp whereby accumulation takes place toward the center of the squeegee. It is claimed that according to standard methods, the intensity of shade in the printed areas varies, forming darker and lighter stripes in the direction of the filling. The machine described aims at overcoming this drawback by reversing the direction in which the paste is applied to the stencils. The operator, standing on a platform (4)—see Figs. 1 and 2—spreads the color in direction (x)—see Fig. 2—parallel to the warp of the fabric. The material to be printed runs under platform (4); it is gripped by an endless belt (5) and conveyed to table (6). After printing it is dried by heating elements (7) and (8), finally brought to a drying compartment (16) and rolled up at (18). The essential part of the device is in the supports (10), arranged on both sides of the table (6). The stencils or screens for different colors are placed in these supports. They can be moved on rails (14) at will over table (6), where the pastes are applied one after the other. The heaters (7) may pre-dry the print before applying the next color. Complete drying, however, takes place when the printed goods rest in front of (8) or in the chamber (16). In the meantime another portion of the fabric is printed on table (6).

BLEACHING—PEROXIDE in Alcoholic Solution. B, 2

Brit. P. 637,140

(Wolsey Ltd.—Alexander, Earland—May 10, 1950).

This specification reviews former methods of bleaching fibers with hydrogen peroxide solutions. It is accepted practice to bleach wool or silk by immersing the goods for 3-20 hours at moderate temperatures in solutions of 0.75-3% concentration by weight. The bath is not exhausted under these conditions. Another method resulting in a poorer white but affecting the fiber's strength less consists of padding the goods in peroxide solution, squeezing and then storing the fabrics for a longer time. Other bleaching processes are characterized by an aftertreatment of the impregnated material with steam at a temperature substantially above 212°F. and then storing at temperatures between 120-200°F. In contrast thereto the present patent suggests the impregnation of the goods in a dilute solution of H_2O_2 in monohydric alcohols from C 3 — C 5, preferably in tertiary butanol or amylalchol at a temperature not exceeding 50°C. This is to ensure thorough wetting without allowing any substantial degree of bleaching, to remove excess liquid and to heat at a temperature below 100°C. Protein fibers require a temperature of 60-85°C., vegetable fibers, 60-100°C. Rinsing is only necessary in treating animal fibers. The solvent can be recovered from the vapors by any known method (e.g., by adsorption with charcoal). It is claimed that this process is much quicker than other methods while the result is satisfactory and the fiber's strength is not impaired. An example cites the immersion of botany wool yarns in a 2% solution of hydrogen peroxide in tertiary butanol, after which they are squeezed and dried for one hour in a chamber at 80°C., and then rinsed. The bleached wool was tested for its solubility in alkalis and found to be less damaged, according to this test, than specimens bleached by standard methods.

Reference is made to U. S. P. 1,966,915 (Deutsche Gold-& Silb. Sch. Anst.) describing bleaching with peroxide in non-aqueous, ethylalcoholic solution. Higher alcohols, apparently having a specific effect, are not mentioned in this patent.

"ONIUM"—Compounds Of Different Dyestuffs, Mixed with Vat Dyes. D, 1

Brit. P. 638,124

(Imperial Chemical Industries—Thornton—May 31, 1950).

The new category of dyestuffs, prepared by transforming insoluble dyestuff pigments into water soluble products by linking them through methylene groups to quaternary ammonium- or ternary sulfonium or thiouronium salt groups has been described in Brit. P. 576,234, 576,270, 587,636 and, more recently, in Brit. P. 613,980 (assigned to the same company). The present specification states that dyes of this structure, conveniently called "Onium-dyes" cannot be used in admixture with standard alkaline vat printing pastes because they are affected by the alkaline reducing medium. A solution of this problem has been found by mixing the nonreduced vat dye suspen-

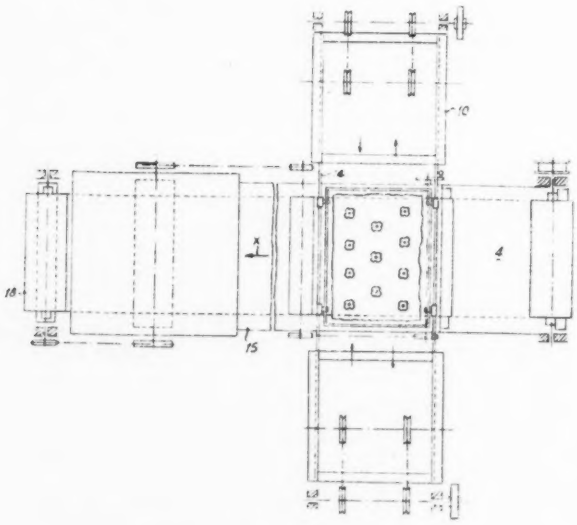

Figure 1—Brit. P. 637,812

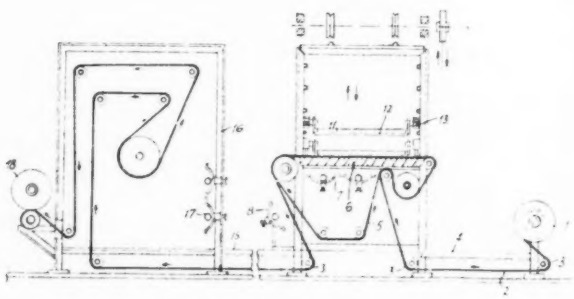

Figure 2—Brit. P. 637,812

sion, combined with Colloresin or an insoluble gum (Ghatto) to the "Onium" printing paste, then developing the print according to one of the known after-treating methods for nonreduced vats (Colloresin process, locust bean gum process, etc.) by padding in an alkaline reducing bath. It has been observed that the Onium-dyes fixed by drying only are no longer damaged by the reducing agents.

An example cites the preparation of (a) a paste of a phthalocyanine-onium dye, plus acid, sodium acetate and sodium dihydrogen phosphate, thickened with gum Ghatto and (b) a paste of Caledone Printing Yellow GNS, containing the same thickener. Cotton cloth is printed with a mixture of (a) and (b), dried and developed in Rongalite-potash- solution, aged 8 minutes, rinsed and re-oxidized. A bright green print, fast to light and washing, results.

Reference is made to the digest of Brit. P. 633,160 and 633,602 in REPORTER 1950, 389.

AGER—Chamber Exhausted of Air D, 5

Brit. P. 638,402
(C. L. Wahl—June 7, 1950).

Uneven results in processing printed or padded fabrics which occur in a subsequent steaming process are often caused by pockets of air or other gases remaining in folds of the material before the steam comes in contact with the goods. Local overheating and irregular dyeing or printing effects are observed here. The present invention suggests prevention of this disadvantage by use of a steaming device, illustrated in the accompanying drawings. The fabrics are wound around a perforated ("skeleton") tube (H) and placed in the center of a cylindrical shaped steam chamber (A). A small carriage (C), running on rails (a) plugs off the fabrics —see left hand side in Fig. 1. It contains a seating (a') which fits into the pipes (e) which are connected with a vacuum pump so that air can be exhausted at the same time from the interior of the fabrics as well as from the bottom of the chamber. On the right hand side of the chamber a similar removable support (C') is provided to shut off the material after the fabrics have been inserted into the chamber. The chamber, which is tightly closed by clamps (b) and bolts (b'), is first evacuated; thereafter steam (or gas) is slowly admitted through pipe (d) —See Fig. 2—, penetrating through the perforated wall (D) and sweeping out the remaining air through the pipes. Then valves (e^2) and (e^3) are closed, more steam is led in the chamber and pressure increased until the desired steaming effect is attained. A heated pipe may be introduced into the center of (H). The apparatus may also be used for heat treatments, requiring absence of air, by injecting a pre-warmed inert gas instead of steam.

Reference is made to several devices used in the dyeing technique, which comprise evacuating chambers containing textile goods before the introduction of dyestuff solutions (e.g., Brit. P. 450,198—Beyer or Ger. P. 636,822—Obermeier). It is interesting to note that the same principle, frequently suggested in dyeing operations, has apparently not yet been proposed for aging or steaming printed or padded textiles.

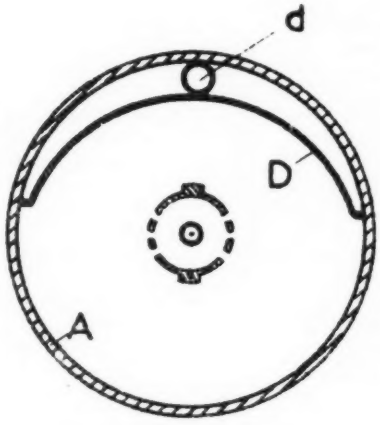

Figure 2—Brit. P. 638,402

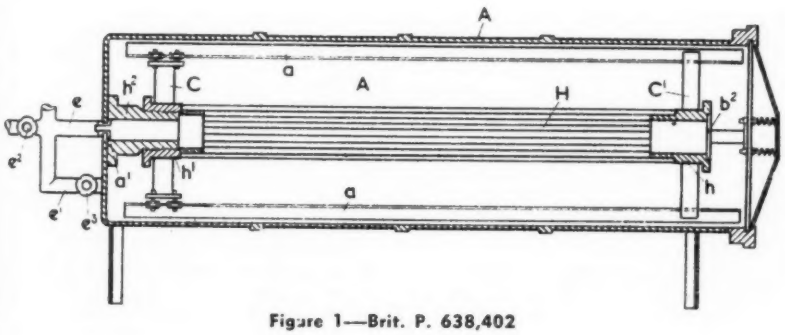

Figure 1—Brit. P. 638,402

SULFUR DYE PREPARATION —With Degraded Carbohydrates. Alkalisulfides C, 5

Brit. P. 636,399
(Ciba Ltd.—April 26, 1950).

A degradation product of a natural carbohydrate is treated at temperatures not substantially above 108°C. with an alkali sulfide and the product obtained thus is dried at relatively low temperatures. The reaction occurs in concentrated aqueous solutions under normal conditions without requiring pressure. Examples for these degradation products include sulfide treated dextrin or British gum. It is advantageous to apply commercial products containing crystallization water, which supplies the necessary aqueous medium by melting. The working temperature depends on the state of degradation of the carbohydrate used. Low molecular products (glucose or other compounds of the sugar group) need lower reaction temperatures (60-80°C.) while the less degraded substances (British gum) require temperatures between 80-100°C. The final products, dried in vacuo, are stable and very slightly hygroscopic. The alkalinity and the salt content of a sulfur dye bath can be considerably reduced in replacing the normally employed sodium sulfide by these preparations. Consequently, preparations containing the condensates are readily soluble in aqueous solutions which can be used as dyebaths without preliminary reduction. A preferred form of this invention consists of converting the dyestuff into its leuco compound, adding the degraded carbohydrate and reacting the components as mentioned above. An example cites the stirring of 50 p. of dextrin at 80°C. into 25 p. sodium sulfide, melted in its own water of crystallization. An exothermic reaction sets in, whereby the temperature rises to 105-108°C. After a few minutes a magma results, which is dried under reduced pressure and pulverized. One part of a sulfur dyestuff (obtained by sulfurizing Indophenol) is mixed with 30 p. of this reaction's product. A stable composition results.

Reference is made to U. S. Pat. 2,057,668 (1936—Dusseldorf Chemical Co.), describing the manufacture of a sulfur dye preparation by mixing the nonreduced sulfur dyestuff with invert sugar. This composition is immediately added to the dyebath.

Brit. P. 418,746 (1934—Du Pont) which is quoted states that the dye is mixed with molasses and alkali-sulfide; the latter is used in a quantity sufficient only for rendering the dyestuff soluble in water while an excess of alkali sulfide has to be added in the dyeing process proper.

A British View—

THE ART AND TECHNIQUE OF SLEEPING AT MEETINGS*

DON'T tell me that you have never been at the point of sleeping. I expect a full understanding from all, particularly from those, who, by compulsion, politeness or occupation, must attend meetings where they listen to lecturers who nearly all commence by saying that they are unworthy to talk on their chosen subjects and who end by disclaiming any real value in their contributions. The chairman, for his part, invariably promises the listeners at the outset that they may expect a discourse of exceptional interest, and ends by saying that the lecturer has done very well, all that he, the chairman, has promised.

Since you know what both the chairman and the lecturer say at the beginning and end, you may be sure that a quiet period lies before you, quite undisturbed by your dear family or your work, and it is therefore understandable that sleep should creep slowly into your mind. So, after some show of resistance you feel control slipping and your mind becomes fogged—and finally you sleep. Of course, you have the excuse that you are tired after your day's labor, even if it consisted merely in waiting for lunch, tea, drinks and the clock striking five. If, as may well be the case, the room is darkened for lantern slides, sleep comes more easily and is more profound.

Danger may lurk for you in the case when the lecturer mentions your name in quoting your own work as you sit unconscious. If he knows of your sleeping habits he may, with malicious joy, express a desire for you to take part in the subsequent discussion. And you know nothing of it!

Now your difficulty is to enjoy your sleep and yet remain unobserved even by your neighbors. It is here that experience in the art will help, and the writer feels that he does a good and humanitarian work in advising his fellows.

How can you make ineffective all the potential disturbers of your sleep? You must train yourself not to be aroused by changes from light to dark when slides are shown. You must learn to take no notice of those noises caused when the lecturer thinks he must be witty and the well-educated—or polite—audience is driven to laughter.

You must beware of an ill-positioned neighbor lest your head should fall on his breast—probably to be painfully spiked by the pencils which decorate his pocket. You must organize your precautions. Make treaty with your neighbors that they will stand—or sit—guard over your sleep and, as in war, arrange that if one sleeps the other may watch. You can do this only with completely reliable people, because, as you must have observed, sleep is contagious, and your sentry may also be overcome.

There are some who are without the ability to sleep at meetings or whose habit is to talk in their sleep, mentioning perhaps the names of girl friends or even of wives. Such should not attend meetings.

The more frequent and less dangerous habit of snoring can have unpleasant effects. To prevent your accompanying the lecturer with sounds varying from a piano performance on the flute to euphonium fortissimo your sentry must be armed with a suitable spiky weapon to apply to an appropriate spot if nudging will not serve.

If sleep must be avoided you may have to do cruel things to yourself, such as putting nails or peas in your shoes or sitting in a chair with a cracked seat. You might help by choosing a chair with one short leg and keep awake by keeping your balance.

You may succeed in passing the time without sleep by thinking of matters undreamt of by the lecturer, for instance, to give contrasting ideas, by working out your income tax or by contemplation of the most attractive of the ladies who may be present.

Let us suppose that you slept and that your sentry informs you that you have been asked to join in the discussion. You must do so for polite or other reasons. Your luck is in if, as often happens, you have had a preprint of the lecture. You can then prepare your share in advance and spring quickly from sleep to action. But what of the worst case, when you have been quoted, and, although your sentry has not told you of it, you have to talk? Your only safe course is to talk of something far removed from the subject of the lecture and thus be on equally safe ground whether he has attacked you or praised you.

My experience is that sleeping at meetings is general and depends in no way on sex, race, creed or political convictions. I may be wrong about the last, for I am led to believe that certain of our Parliamentarians, who have nothing on their minds but our welfare, are overindulgent in the art of sleeping.

You may find the right solution by cultivating a half-conscious sleep, like that of the hunted deer or other animals which, on the approach of danger, can at once awaken and act as advisable. Too deep sleep might leave you in the unhappy position of finding yourself alone in a cold, dark and empty hall from which all other life had long since gone.

Finally, my words do not concern sleepers in picture houses where their habits are recognized and accepted, specially the inhabitants of the back rows. Concert hall sleeping is also understood, and is indeed encouraged by masters like Bach, whose repetition of phrases is narcotic, unlike jazz—emetic.

Should this advice fail to make you safe in attending meetings, do not go to them! Long experience suggests that you may lose little by being absent.—Anon.

* A letter to the Editor, Journal of the Textile Institute. Vol. 41, No. 4, April, 1950.

Proceedings of the
American Association of Textile Chemists and Colorists
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AUGUST 7, 1950

AMERICAN DYESTUFF REPORTER AWARD

The first presentation of the AMERICAN DYESTUFF REPORTER award will be made at the 30th Annual AATCC Convention to be held October 17-18-19, 1950 at the Hotel Statler, New York, under the auspices of the New York Section.

The Award was endowed by the Howes Publishing Company as a memorial to Alfred P. Howes, Founder of the REPORTER, and its purpose is to encourage the presentation of the best possible papers before local and national meetings of the Association. The Award, $200 annually, will be presented to the author or authors of the paper considered best in the opinion of the judges. Any technical paper presented before a local or national meeting of the AATCC and published in the *Proceedings* will be eligible with certain exceptions noted in the rules below. The rules, as approved by the Council, follow:

RULES

NAME.—AMERICAN DYESTUFF REPORTER Award.

AWARD.—$200 to the author or authors of the paper considered best in the opinion of the judges.

PURPOSE.—To serve as a memorial to Alfred P. Howes, Founder of the AMERICAN DYESTUFF REPORTER, and to encourage the presentation of the best possible papers before local and national meetings of the AATCC.

ELIGIBILITY OF PAPERS.—Any technical paper presented before a local or national meeting of the AATCC and published in the *Proceedings* as they appear in the AMERICAN DYESTUFF REPORTER will be eligible, with the following exceptions: Intersectional Contest papers, papers by employees of the AATCC, reports of work substantially subsidized by AATCC, or reports of research committees. It is a condition of eligibility that the paper have its first publication in the *Proceedings*.

ELIGIBILITY OF AUTHORS.—The author or authors of any paper meeting the above-mentioned requirements will be eligible to receive the Award.

JUDGING PERIOD.—Papers published in the *Proceedings* from July 1st of one year to June 30th of the next year will be considered.

JUDGING COMMITTEE.—The Chairman of the Publications Committee shall appoint a committee of 3, other than members of the Publications Committee and representing diversified textile interests, to select the 3 papers which, in their opinion, are the best published. The Editor of the *Proceedings* will serve on this committee as advisory secretary without vote. These three papers shall be submitted to the Publications Committee for selection of the one best. The Award shall be determined by majority vote of the Publications Committee. Selection of a winner shall be made one month before the National AATCC Convention. The Chairman of the Publications Committee will welcome suggestions from members as to papers which shall be considered. They should be sent to the Chairman by June 30th.

BASIS FOR JUDGEMENT.—The papers shall be judged upon the following basis: originality, scientific value, practical value, and presentation of material as published.

TIME OF AWARD.—Annually at time of the National AATCC Convention.

ACKNOWLEDGEMENT. — Suitable acknowledgement of the donor of the fund, and purpose of the Award, shall be made at each presentation.

"Advancement, Achievement Through Continued Cooperation"

29th ANNUAL CONVENTION

Wentworth-By-The-Sea, Portsmouth, N. H.

SEPTEMBER 28-30

Auspices of the Rhode Island Section

AATCC AWARD PRESENTATIONS

THE American Association of Textile Chemists and Colorists Award for the year 1950 has been presented to the following students at their respective schools.

Frederick M. Hornyak	Lowell Textile Institute
John Glenn Templeton	North Carolina State College
Richard Newell Combs	Philadelphia Textile Institute
J. Raymond Nisbet	New Bedford Textile Institute
Robert R. Stewart, Jr.	Georgia Institute of Technology
Thomas L. Howle, Jr.	Clemson College
Donald Talbot Tweedy	Bradford Durfee Technical Institute
Armand DiMeo	Utica Technical Institute

The above award is made annually at each school having a Student Chapter of the Association to the student who, in the opinion of the faculty of the school, has been the most outstanding in his work in Textile Chemistry and Dyeing.

The award this year was in the form of a recent technical book, "The Chemical Technology of Dyeing and Printing," by L. Diserens. The student award committee considers that this book will be extremely valuable to the recipients from a theoretical as well as a practical viewpoint.

The members of the committee are: Harold C. Chapin, Thomas R. Smith, Percival Theel, George H. Wood, P. J. Wood, and Joseph Lindsay, Jr., *Chairman*.

Richard B. Stehle, Brehm and Stehle, Section Chairman (left) and Dr. F. Dannerth, Scholler Bros.

CALENDAR

COUNCIL

Meetings: Sept. 28-30 (Portsmouth, N. H. Convention) Nov. 17 (New York).

NATIONAL CONVENTIONS

1950: September 28 to 30, Portsmouth, N. H
1951: September 17-18-19, Statler, New York.
1952: Boston.

HUDSON-MOHAWK SECTION

Meetings: Sept. 15 (Albany), Oct. 20 (Utica), Dec. 8 (Albany), Jan. 19, 1951 (Albany), Mar. 16, 1951 (Albany), May 11, 1951 (Albany), June 22, 1951 (Annual Outing).

MID-WEST SECTION

Meeting: October 28 (Chicago, Ill.).

NEW YORK SECTION

Meetings: October 30 (Swiss Chalet, Rochelle Park, N. J.), November 17 (Swiss Chalet), Jan. 12, 1951 (Hotel New Yorker), Feb. 23, 1951 (Hotel New Yorker), March 30, 1951 (Swiss Chalet), May 4, 1951 (Swiss Chalet), June 15, 1951 (Outing).

PHILADELPHIA SECTION

Meetings: October 28 (Meeting-in-Miniature, Philadelphia Textile Institute), December 8, January 17, 1951.

PIEDMONT SECTION

Meeting: October 28 (Charlotte, N. C.)

RESEARCH COMMITTEE

Meetings: Sept. (Portsmouth, N. H., Convention), Nov. 17 (New York).

RHODE ISLAND SECTION

Meetings: October 27 (Providence Engineering Society Hall), November 17 (Johnson's Commodore Room).

SOUTH CENTRAL SECTION

Meetings: August 18-19 (Summer Outing—Read House—Hotel Patten, Chattanooga Country Club—Chattanooga, Tenn.), Nov. 4 (Hotel Patten, Chattanooga, Tenn.).

SOUTHEASTERN SECTION

Meetings: September 23 (LaGrange, Ga.), December 9 (Atlanta, Ga.).

Annual Outing, Philadelphia Section

THE Annual Outing of the Philadelphia Section was held on Friday, June 9th at the Torresdale-Frankford Country Club. The affair was under the Chairmanship of Richard L. Jones of Royce Chemical Co., assisted by A. E. Raimo of John Campbell & Co.

The bright, sunny day attracted 373 members and guests who played golf, quoits, darts, cards, and enjoyed trapshooting. Following dinner, an excellent floor show finished off the day of relaxation.

James C. Jordan, American Aniline Products, won low-gross golf honors winning the Philadelphia Section trophy, while low-net was won by Wendell F. Simmons of Blaw-Knox Co. Among the guests, low-gross was won by W. L. Cleary of the Barrett Division, and low-net by William Kamarek, Richmond Oil, Soap and Chemical Co.

The "Hole-in-one" Contest was won by Tom Greenwood of Globe Dye Wks. with second place by J. M. Jester of Amalgamated Chemical Corp.

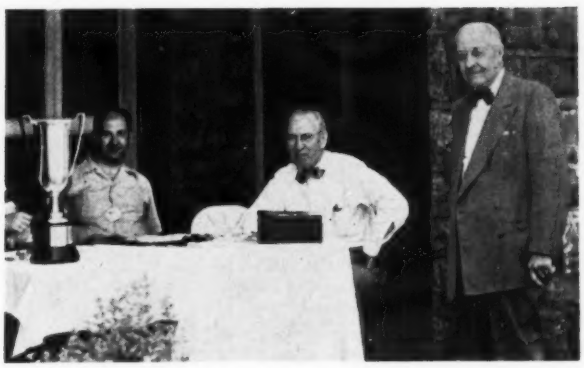
Winners in other sports were: *quoits*—Herman Metzler, E-Cut Knitting Mills and Bill Griesinger, Atlantic Refining Co.; *darts*—Bill Rhodes, L. G. Kauderer Co., and James Lord, Waverly Dyeing & Processing Co.; *cards*—Claude I. Ruth, Wm. G. Leininger Knitting Co., and George W. Smith, Reamstown Hosiery Mills; *trapshooting*—Herman Hardwick, Louden Dyeing Works, William H. Drum, Louden Dyeing Works, A. Anderson, Calco Chemical Div., Robert Schoellhorn, Calco Chemical Div. and S. G. Davenport, Kal. Mfg. Co.

Respectfully submitted,
THOMAS H. HART, *Secretary*

L. to R.—J. Fancourt, W. F. Fancourt Co.; Not identified, E. Pierce, H. W. Butterworth & Sons.

Harry L. Morgan (left) and Russel E. Montgomery, both of James Lees and Sons.

L. to R.—J. Culver, Ciba Co.; and Messrs. Wolf, McGregor and Hunt, Franklin Process Co.



L. to R.— Tom Hart, Section Secretary; C. Harry McCandless, Venango Engr. Co.; and Richard S. Cox, Dean of Philadelphia Textile Institute.

Arthur M. Gordon, Martin Fabrics Corp.

PHILADELPHIA SECTION ANNUAL OUTING

TORRESDALE-FRANKFORD COUNTRY CLUB

JUNE 9, 1950

L. to R.—C. Baeringer, Eagle Dyeing and Finishing Co.; J. Jordan, Alco Oil and Chemical Corp.; and C. Haas, C. J. Haas, Inc.

John Koch, Jr., Artcraft Hosiery Sales Corp. (putting) and Richard L. Jones, Royce Chemical Co., Outing Co-Chairman.

An informal shot taken in front of the club.

ONE HUNDRED AND SEVENTY-SECOND COUNCIL MEETING

THE Council held its 172nd meeting in the Hotel Mount Royal, Montreal, Canada, on Friday morning, June 9, 1950. Present were President C. Norris Rabold, presiding; George O. Linberg, Vice President; Thomas R. Smith, Past President; John M. Gould and John H. Skinkle representing Northern New England; Raymond W. Jacoby, Robert W. Joerger and W. George Parks representing Rhode Island; Kenneth H. Barnard representing New York; Walter F. Fancourt 3rd, Lloyd O. Koons, Ernest E. Rettberg, Jr., Frederick V. Traut and Jackson A. Woodruff representing Philadelphia; A. Kempton Haynes and Walter M. Scott representing Southeast; Joseph H. Jones representing Mid-West; Jack Epelberg representing Hudson-Mohawk; Harold W. Stiegler, Research Director; guests from Canada and the United States; and Harold C. Chapin, Secretary. A train accident delayed the arrival of a considerable number of members from New York, Philadelphia and the South until afternoon.

The Secretary's report of the 171st Council meeting and financial report of May 31, and the Treasurer's report of June 1, were accepted. The amendment to the Bylaws, changing the name Merchandise Committee to Committee on Technical Supplies, was reported adopted by letter ballot of the Council. Approval was voted for the proposed Constitution amendment providing for four Regional Vice Presidents, which was presented at the 171st Council meeting, and is to be subject to letter ballot of all Senior members in October.

The budget presented by the Committee on Appropriations was adopted, with additions for binding a thousand more copies of "Analytical Methods," and for printing and mailing questionnaires on the planning of conventions.

Mr. Jacoby reported on plans for the Portsmouth convention and on the "Vat Dye Monograph," and Dr. Parks on the technical program for the convention. For Mr. O'Neil, Professor Skinkle read a report on plans of eight Sections for Intersectional Contest papers. Mr. Linberg reported on Corporate memberships.

The President announced the appointment to a new Convention Committee of K. H. Barnard and S. L. Hayes for one year, W. F. Fancourt, 3rd and G. H. Wood for two years, and C. W. Dorn and G. O. Linberg for three years. This committee is to take office in January, 1953, for the purpose of managing conventions. For that year an invitation has been extended by the Mid-West Section. If the Council accepts, the committee will manage that convention only to the extent that the Mid-West Section elects.

For the committee appointed to recommend future Council meeting dates, Mr. Joerger named, beyond the Sept. 18 and November 17 dates already chosen, the dates in 1951 of January 19, April 20, June 15, October 18 and November 16. The April meeting is to be in Raleigh, N. C.; the others in New York City. Except for convention dates, each is the third Friday of a month, which may set a precedent for future years. Attention and comments are invited from all Sections of the Association, to the end that conflict with Section meetings be avoided.

Elected to Corporate membership were Colonial Print Works, Good Housekeeping Institute, the Belle Chemical Co., Inc., and Tex-Chem Company. Each of the following was elected to the class of membership specified, as of thirty days from publication of application, provided no objection be received meanwhile by the Secretary.

SENIOR

E. C. Benson
C. B. Capron
V. V. Carpenter
E. P. Clark
E. C. Collins
E. W. Counsell
K. Etholm
R. W. Farrell
A. Fassnacht
B. Fay
E. A. Feimster
D. C. Forsht
E. Gallessi
A. J. Gard
H. C. Gerlach, Jr.
R. F. Graupner
P. F. Grubb
C. M. Helm
J. J. Hepburn
D. C. Holland
L. N. Hurley
R. L. Kennedy
H. R. Krasley
W. F. McEnerney
W. S. McIntosh, Jr.
D. Meltzer
J. K. Milliken, Jr.
W. Milne
H. M. Neumann
J. J. Newton, Jr.
L. R. Parham
C. F. Pope, Jr.
D. I. Randall
J. A. Ross
W. R. Shaw
A. Stefcik
R. C. Sullivan
K. Sumi
R. M. Thomas
J. W. Trainter
N. F. Vandervoort
F. L. Waring
T. G. Webber
J. Wilson
M. Wilson
H. H. Wordell

SECRETARY'S FINANCIAL REPORT — MAY 31, 1950

Received and Transmitted to Treasurer	*Applications*	*Dues, Regular & Reinstate*	*Dues, Corporate & Sustaining*	*Miscellaneous*	*Totals*
August 1, 1949 to April 5, 1950	$4,127.50	$37,529.00	$43,032.50	$23,601.95	$108,290.95
April 5 to May 31, 1950	592.50	439.50	825.00	2,178.97	4,035.91
Totals in fiscal year to May 31	4,720.00	37,968.50	43,857.50	25,780.92	112,326.92
Leaving deposited by Treasurer with Secretary					4,987.45

Miscellaneous items	
Dividends	$202.90
Reporters & reprints	20.75
Year Books	272.50
Crockmeters	536.00
Crock cloth	373.00
Multifiber cloth	175.45
Moth cloth	137.35
Water test apparatus	147.50
Dyed Standards	64.00
Knitted tubing	10.50
Gas fading units	34.80
Buttons	4.00
Color transfer charts	84.50
Colour Index	91.00
Analytical Methods	25.30
	$2,179.55
Less Bank Charges	.58
	$2,178.97

JUNIOR

M. Alpert
M. F. Bond, Jr.
W. H. Carlson
J. E. Cline
E. J. Elliott
H. L. Falkenberry
J. L. Gerhard, Jr.
D. G. Hedberg, Jr.
W. C. Herron, Jr.
J. H. Jacoby
C. J. Kurowski
W. T. McGhee, Jr.
G. P. Pappas
B. A. Thompson, Jr.
C. A. Tier, 3rd
G. T. Womack

ASSOCIATE

C. J. Beatse
W. E. Breagy
I. M. Buch
I. W. Diamond
C. S. Hall
E. H. Jourdan
A. R. Macdonald
T. C. Roberts
T. A. Sawyer
E. J. Schiller, Jr.
O. F. Shepardson
J. Sikora
E. Wilks, III

STUDENT

E. B. Armstrong, Jr.
J. E. Burke
M. M. Christie
M. R. Federman
R. W. Lenz
C. Liu
V. J. Magiera
A. A. Reich
A. M. Williams

Transferred from other classifications to Senior membership were:

J. J. Morris
A. V. Rocha
F. Schlaeppi
C. Schreur

On Friday afternoon, following the Council meeting, Fred Knight, President of the Council of the Canadian Association of Textile Colourists and Chemists, extended the greetings of our hosts. Mr. Rabold replied for our Association, and introduced Dr. Milton Harris, who spoke on the subject, "A Chemist Looks at Textile Fibers." He was followed by H. K. Torpey, President of the Textile Technical Federation of Canada.

J. P. Redston, Chairman of the Quebec Section of the Canadian Association of Textile Colourists and Chemists, then introduced Dr. A. C. Goodings, Director of the Textile Section, Ontario Research Foundation, who presented a paper entitled, "Observations on the Properties of Wool, with Particular Reference to Scouring." Mr. Linberg closed the afternoon meeting with an expression of hope for cooperation in research by the two Associations.

Following a dinner Friday evening, the speakers were Fred Knight, Norris Rabold, William King of the Canadian Textile Journal, Paul Beaulieu, Minister of Trade and Commerce of the Province of Quebec, and Henry F. Herrmann, Past President of our Association.

On Saturday morning Mr. Boanar presided at a research meeting and forum. Dr. Stiegler described organization and work at Lowell. Illustrating the work of committees, Mr. Seibert spoke on Wash Fastness, Mr. Leonard on Continuous Wool Scouring, Mr. Babey and Mr. Seibert on Light Fastness, and Dr. Herman Hager on Flammability. The forum was on three general subjects. Questions on cotton were answered by T. R. Smith, S. H. Williams, J. Leigh, R. W. Joerger, C. Wells and C. N. Rabold; on synthetic fibers by A. W. Etchells, J. B. Neely, C. R. Teichgraber, J. A. Woodruff, C. E. Coke and A. D. Nute; and on wool by J. H. Jones, F. V. Traut, J. F. Warner, L. H. Turl and W. Prentice.

Golf, dinner and singing at the Lachute Country Club completed the two day program.

Respectively submitted,
H. C. CHAPIN, *Secretary.*

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Report of Western New England Outing

THE third annual outing of the Western New England Section was held on June 23rd at the Wallingford Country Club, Wallingford, Connecticut. Under the direction of outing chairman Oscar Edelstein an exceptionally fine program of events was enjoyed by those present. The festivities concluded with an excellent dinner in the evening. Prizes were awarded as follows:

GOLF

Low gross, members:
J. Diamond, Talon Co., 83-15-68
Low gross, guests:
C. I. Lakey, Jacques Wolf, 87-20-67
C. Stott, 87-15-72
L. Tubbs, Arnold Hoffman, 87-16-71
Kickers:
1st, R. Fitzgibbons, Ciba Co., 100-25-75
2nd, G. Klingberg, A. Wimpfheimer & Bros., 110-35-75
3rd, R. Secord, duPont Co., 97-22-75
Pro's kickers:
M. Edelstein, 110-30-80
H. Steen, Geigy Co., 101-28-73
J. Lynn, Am. Cyanamid, 107-30-77
Other winners:
A. Bailey, duPont, 98-22-76
H. J. Barnett, 105-22-83
J. Boyko, Sidney Blumenthal, 118-40-78
R. Carey, General Dyestuff, 107-31-76
A. Curt, U. S. Finishing, 102-32-70
W. J. Curtin, Naugatuck Chemical, 96-30-66
J. B. Dick, Pond Lily, 101-19-82
O. Edelstein, Pond Lily, 132-50-82
J. Fanning, Brunswick Worsted, 94-20-74
R. Farwell, duPont, 104-26-78
E. Gamble, duPont, 92-18-74
N. Glade, Am. Cyanamid, 107-35-72
H. Goerner, Am. Aniline, 114-20-94
J. Harley, Ciba Co., 93-26-67
S. Hoffman, Hat Corp., 89-20-69
E. Holburt, 112-20-92
W. Lowell, Max Pollack, 121-35-86
N. Mellin, Mellin Chemicals, 102-35-67
A. Nyquist, Am. Cyanamid, 99-30-69
C. Suthern, Arnold Hoffman, 112-25-87
P. Tessier, 140-20-120

PUTTING CONTEST

1st, A. Bailey, 30
2nd, S. Hoffman, 31—A. Nyquist, 31

DARTS

1st, W. McCann, Southbridge Finishing
2nd, E. Miller

HORSESHOES

1st, J. Spalding, American Fabrics
2nd, J. Spalding, Jr.

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

50-20

Education: Textile school, chemistry and dyeing.
Experience: Chemist and dyer.
Age 31; married; references; vicinity of New York City preferred.

7-24, 8-7

50-21

Education: Textile technology. Utica Technical Institute.
Experience: two months summer employment in textile mill.
Age 20; references; New York and New England preferred.

7-24, 8-7

50-22

Education: Rutgers University, B. S., chemistry.
Experience: Chemist and plant manager, manufacture of organic chemicals, including textile.
Age 37; two dependents; East or South preferred, but not essential.

8-7, 8-21

50-23

Education: B.S. Chemical Engg.
Experience: Chemical development, testing, and laboratory supervision.
Age 33; married; references; East preferred but not essential; technical sales, development or production.

8-7, 8-21

INTERSECTIONAL CONTEST RULES

THE National Intersectional Contest Committee has announced the following rules to be used as a guide by the various sectional committees. They will supercede those published in the AMERICAN DYESTUFF REPORTER, July 14, 1947. In general, only a few changes in the original rules have been made.

SUBJECT

Any subject may be selected, and it is assumed that it will relate in some manner to textiles. It is obvious that the strategy is to select a subject which satisfies one or all of the requirements which afford an opportunity to win a prize. There are certain limitations such as:

1. A Section should not use as the body of its paper, work done by some subcommittee of the Research Committee of the AATCC. A Section may, however, extend or expand some phase of a general research project.
2. The finished paper should represent a contribution by a representative group of members in the Section; however, reasonable participation by invited nonmembers is permissible. Help may be obtained from schools, commercial labs, or industry to foster the committee's efforts, but not as a substitute for their own original work nor may any school, commercial laboratory or industrial establishment claim credit for the work. It is and must be the property of the committee which presents it.
3. The subject should be of a nature not to involve the Association in patent controversy. Patentable processes or ideas should not be used as subject matter of contest papers since, when so used, they become the property of the AATCC.

It is important that committees be formed well in advance to provide sufficient time for carrying out the work. It is suggested that each committee be formed two years in advance of the convention date. If it is found that two sections have chosen the same subject, the matter is brought to their attention so that they may continue on the same subject or not as they prefer.

The title of the paper should not be released for publicity until approved by the National Intersectional Contest Chairman. All news releases must be handled through the National Chairman of Publicity.

SPEAKER

Any member of the Association may be the speaker. He need not necessarily be a member of the Section for which he is speaking.

JUDGE

Any member of the Association may be the judge representing a Section. It is felt, however, that the judge should be, if possible, a member of the Section which he represents in order that each Section may be fairly and equally represented in the final judging. It is recommended that an alternate judge also be chosen so that he may carry on in the event that the first-choice judge is unable to complete his duties.

The judge chosen to represent a Section is free to call upon anyone for expert advice as it is unusual for any one man to be competent in all fields covered by the different papers. The actual rating of the paper, however, is his privilege alone, and a rating sheet will be supplied by the "Chief Justice." The "Chief Justice" is appointed by the National Intersectional Contest Chairman.

RATING OF PAPERS

The papers of each Section are rated by the judges on the following basis:

For originality	30 points max.
For scientific value	30 points max.
For practical value	30 points max.
For presentation	10 points max.
TOTAL	100 points

Each judge will rate each paper independently on the above basis, and the paper receiving the highest score will win the contest. The paper with the next highest score will receive second prize, and the paper with the third highest score will receive third prize.

It is not necessary that a Section consider only subjects which meet all three qualifications of originality, scientific value, and practical value. Seldom can a Section produce a paper of this type. It may possess but one or two of the above features. However, the more nearly it does fulfill these requirements, the higher will its rating be.

A paper is acceptable even if a Section failed to complete the work as planned or its completed project produced only negative results.

The judges must submit a report of their voting to the "Chief Justice" just before the presentation of the Contest Papers. At the close of the Contest the judges then must submit their votes for presentation value.

DETAILS OF THE PAPER

The paper is not restricted as to length but its actual presentation will be limited to 20 minutes. This means that a condensed version of the paper, emphasizing its high points, will be given at the meeting while the paper itself will be published in full in the Proceedings in the American Dyestuff Reporter. Please note that the paper is the property of the Association and is not to be released to any other publication.

Sixteen copies of the paper must be furnished to the National Intersectional Contest Chairman at least a month before the Contest. These copies will then be distributed to the judges and the National Publicity Chairman. The judges need a full month to read, review and rate the papers.

The papers should be typewritten, double spaced, using only one side of the sheet and leaving ample margins. One of the copies should be accompanied by the original drawings, in black ink, and glossy photographs. This copy will be used for publication.

EXHIBITS

Any requests for exhibits or display features at the Contest should be made known at the time of submitting the copies of the paper to the National Intersectional Contest Chairman.

Southeastern Section Meeting Report

THE Southeastern Section held a meeting on the YUCHI Reservation near Columbus, Georgia, on May 27, 1950. Arrangements for the meeting were made by Bill Amos of the Eagle & Phenix Division of Fairforest Company, Columbus, Georgia.

Boating, fishing, and swimming were enjoyed during the afternoon. These activities were followed by an old-fashioned barbecue.

The technical session in the afternoon included a symposium on naphthol dyeing. Curt Mueller, Bibb Manufacturing Co., Macon, Ga., acted as moderator and some 26 highly controversial questions were discussed and answered by a panel made up of Bill Williams, General Dyestuff; Bob Nuttall, American Aniline; Henry J. Gambert, Eagle & Phenix; John Boesch, Augusta Chemical; Jim Stradley, duPont, and Leslie Bamberger, Lanett Bleachery & Dye Works.

George Linberg, Monsanto Chemical Company, provided a period of light entertainment during the session following the barbecue.

Respectfully submitted,
RICHARD E. HUDSON, JR., *Secretary*

Photos taken of the Southeastern Section Meeting at the YUCHI Reservation on May 27, 1950.

Report of Piedmont Outing

THE Piedmont Section held its annual summer outing at the Ocean Forest Hotel Friday and Saturday, June 30th-July 1st.

A special luncheon for the ladies, one of the outstanding events of the outing, was held on Saturday.

The results of the balloting for officers for 1950-1951 were announced. They are as follows:

Chairman—Edwin A. Briggs
Vice-Chairman—Hobart Souther
Secretary—W. Chester Cobb
Treasurer—J. C. Whitt
Councilor—Linton Reynolds
Custodian—A. R. Thompson
Sectional Committee—J. L. Moore, Jack Jordan, William D. Livingston and W. Carl Wilcoxson.

These officers will take office at the annual fall meeting to be held in Charlotte.

Henry A. Rutherford, head of the Department of Textile Chemistry and Dyeing, N. C. State College, Raleigh, N. C., and chairman of the Section's Research Committee, met with the members of his committee at 2:00 P.M. Saturday to discuss the sectional paper which will be presented in the Intersectional Technical Paper Contest at the Portsmouth convention.

Robert H. Smith, Chairman of the Section, presided at the banquet Saturday night. J. C. Whitt was chairman of the outing program, and everyone agreed he did an outstanding job. Approximately 300 members and their wives were in attendance.

Respectfully submitted,
W. CHESTER COBB, *Secretary*

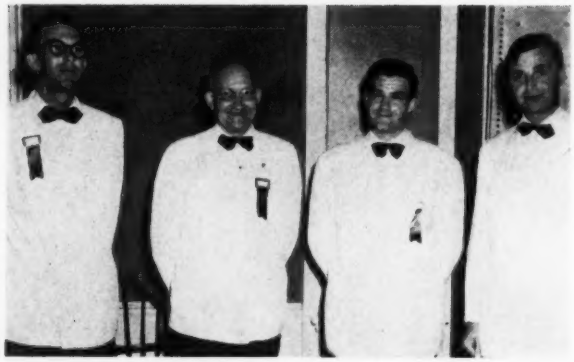
C. Norris Rabold, National President, congratulating Piedmont Section officers and members attending banquet.

PIEDMONT SECTION SUMMER OUTING PHOTOS

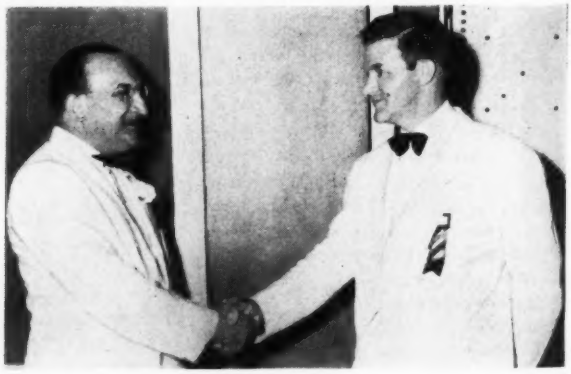
Mrs. E. T. McElwain of Rock Hill, S. C., winner of the grand prize, is shown with a printed rayon tablecloth presented by Burlington Mills. "Uncle Sam" is Publicity Chairman A. R. Thompson.

(1) A group of Section Officers awaiting dinner. (2) L. to R.—C. B. Ordway, Mrs. W. L. Mills, W. L. Mills, and Mrs. Joseph B. Neely. (3) and (4) A portion of the group of ladies at the special luncheon.

Group of ladies with their prizes won at the luncheon, surrounding Uncle Sam who helped in the Independence Day celebration.

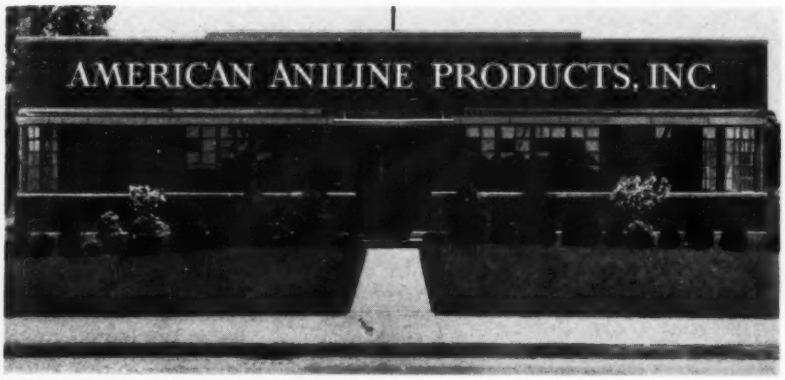


New Officers of Piedmont Section Elected for 1950-51. Reading left to right—J. C. Whitt, Century Division, Standard Hosiery Mills, Inc., Burlington, N. C., **Treasurer**; Hobart Souther, Cone Mills Corporation, Greensboro, North Carolina, **Vice-Chairman**; Edwin A. Briggs, Southern Franklin Process Company, Greenville, North Carolina, **Chairman**; and W. Chester Cobb, Arnold, Hoffman & Company, Incorporated, Charlotte, North Carolina, **Secretary** (Re-elected).



Chairman Robert H. Smith, High Point Chemical Manufacturing Company, High Point, North Carolina extending best wishes to newly-elected Chairman, Edwin A. Briggs, Southern Franklin Process Company, Greenville, South Carolina.

TRADE NOTES • NEW PRODUCTS



Front View of American Aniline Products' New Providence Office.

• American Aniline Opens New Providence Quarters

American Aniline Products, Inc. is now occupying its own building in Providence, Rhode Island, according to an announcement made by George L. Armour, President of the Company, from his offices in New York.

These new quarters, located at 1430 Elmwood Avenue, Providence, will contain the sales and administrative offices of the Providence branch, enlarged and improved warehouse facilities and a modern application laboratory. The new building, of modern design, is a brick and steel structure enclosing about 15,000 sq. ft. of floor space of which more than 11,000 sq. ft. are set aside for warehouse facilities.

The occupancy of these new quarters will improve its service facilities to the textile dyeing, printing and finishing industry in the Rhode Island-Connecticut area, the company states. They further state that the new laboratory will enable the local branch to duplicate any phase of textile wet processing. The new building is situated on the main traffic artery into Providence and yet is removed from down-town traffic congestion. A large loading dock, located on the side of the building affords easy access and quick unloading to large trailer trucks.

Opening day ceremonies and a house warming party were held on Saturday, July 29th and were attended by Company officials as well as several hundred customers and trade associates.

The new building will be managed by Earl Kenneth Bush, formerly of Providence, and now residing in East Greenwich. Mr. Bush, with A.A.P. since 1935, has been manager of the Providence branch since 1945.

• Lucking Appointed to N. Y. Post

W. H. Lucking has been appointed assistant sales manager of Antara Products, General Aniline & Film Corporation. He will make his offices at 444 Madison Avenue, New York.

Mr. Lucking did production research work in the Chemical and Metal Industries from 1916 to 1920. He was subsequently with National Aniline, the Huber Co. and the C. K. Williams Co.—joining the Sales staff of Antara Products in 1948.

• Richards Heads Houghton Sales

D. J. Richards, Vice-President—Sales, E. F. Houghton & Co., Philadelphia, Pa., has been placed in complete charge of all domestic and foreign sales activities since the recent death of G. W. Pressell, formerly Vice-President and Director of Sales. Mr. Richards will also act as Director of Advertising and will supervise the activities of the Product Development and the Sales Development Department.

Announcement is also made that John F. Maisch has been appointed Controller of the company, under the supervision of Wm. F. MacDonald, President and Treasurer.

• Homophthalic Acid Offered

Homophthalic acid is now being offered by Smith-New York Co., Inc., Freeport, N. Y., in laboratory quantities. Interest in the chemical centers around its possible use in organic synthesis, such as its reaction to form imides, amines, and alpha-arylidene derivatives. It may be nitrated in the 4-position, thereby leading to substitution in that position with amino or alcohol groups, or it may be reacted with phosphorus pentachloride to yield the 3-chloroisocoumarin derivatives, the company states.

A brief review of the literature is offered in technical bulletin No. 134, available directly upon request.

• Monsanto Appointment

J. W. Stewart of Westwood, Mass., has been appointed field research supervisor for textile chemicals for Monsanto Chemical Company's Merrimac Division, Dr. F. L. Matthews, Merrimac research director, recently announced.

At the same time, Dr. Matthews announced formation of a new research unit, headed by Mr. Stewart, to perform application research at grass roots levels.

A former member of the Merrimac textile chemical sales department, Mr. Stewart joined Monsanto in 1947. He is a member of the A.A.T.C.C.

• Substantive Delustering Agent For Rayon

Hodges Associates, 11 W. 42nd St., New York, N. Y., are handling, among other products of Badische Anilin- & Soda-Fabrik, Ludwigshafen, Germany, a substantive delustering agent for rayon and staple fiber called Dullit SL. The product is primarily a white pigment in combination with a cation dispersing agent.

Dullit SL comes in a white paste, said to be easily dilutable with the quadruple quantity of warm water to a milky-white, finely dispersed suspension, which is reportedly indifferent to salts causing hardness of water. It is suggested that plant water with alkaline reaction be neutralized, however, before adding Dullit SL. It is reported to have good affinity, and delusterings produced with it are reported fast to rinsing and dustless while giving rayon and staple fiber a full, soft feel. Dullit SL is not compatible with all normally applied anion active detergents, softeners, wetting and levelling agents, it is stated, and these products must be removed by thorough rinsing if they are on the materials to be delustered.

The product can be applied on the winch vat or jig, it is stated, but because of its high substantivity, a processing on the foulard is not advised by the manufacturer.

• Fox Lauds Lydon Appointment at LTI

Kenneth R. Fox, former President of the Lowell Textile Institute recently made the following statement regarding appointment of his successor, Martin J. Lydon:

"The appointment by the Board of Trustees of Martin J. Lydon as the new President of Lowell Textile Institute should be widely acclaimed by all interested in the welfare of the Institute. His background in the educational field combined with his energy, imagination, and courage will be most effective in developing further the prestige and value of the entire program. Important to all industry of New England is the fact that Mr. Lydon's background in economics and business administration will be most helpful in attacking vigorously the problems facing industry today. I am very happy that Mr. Lydon was chosen and he has my full support in meeting the challenge placed before him."

• Dye Cost Breakdown

According to a release by General Aniline & Film Corporation, it costs approximately 29 cents for the colors in a man's suit, shoes, shirt, socks, hat, underwear and necktie, or about 0.5 per cent of the total cost of those items. They break the dye cost down as follows: suit—14c, shoes—8c, hat—2½c, underwear—1½c, socks—1c, shirt—1½c. The dyes in the necktie now cost about .68c as compared to .55c in 1940.

The cost of dyeing a woman's street apparel runs about half that for a man's. The chief item is a dress or suit at about five cents. The dyes in hosiery and lingerie cost only a cent.

As to household furnishings, the dyes in the rugs, drapes, slipcovers, upholstery, blankets, towels, linens, etc., cost about $25.00 for a three-room apartment, according to the report. Dyes for about 20 lbs. of blanket now run about $1.50 as compared to $1.27 in 1940, the report states.

Weight of the thing to be dyed remains the controlling factor for quantity of dyes and, consequently, the cost, it is stated.

• Leach Joins Harrison Sales Staff

Harry Leach, formerly with Richard Haworth, Inc., Providence, R. I., dealer in dyestuffs, is now connected with A. Harrison & Co., Inc., Manufacturing Chemists, Pawtucket, R. I., as a salesman.

Dr. Jesse Werner

• Dr. Werner Appointed to New Grasselli Post

Dr. Jesse Werner, of Brooklyn, N. Y., has been appointed assistant to the Process Development Manager of the Grasselli Works Division, General Aniline and Film Corporation, it was announced recently by Russell I. Baker, plant manager. Prior to assuming his present position Dr. Werner had been a Section Leader on the Process Development staff for several years.

Dr. Werner is a member of the Board of Editors of "Chemical Formulary" and the author of a number of sections in the "Encyclopedia of Chemical Technology" concerning dyestuffs, intermediates and other phases of the organic chemical industry. A contributor to various publications in chemistry and chemical engineering, Dr. Werner has written the annual review paper on Amination by Reduction for the Unit Processes Symposia of *Industrial and Engineering Chemistry*.

He is a member of a number of professional organizations including the AATCC.

Mr. Baker, who made the announcement, recently observed his 30th anniversary with the company.

Mr. Baker joined the company as a chemist in 1920 when the plant was one week less than five years old. At that time several sulfur color dyestuffs and a few intermediates were the principal products. Today the 115-acre plant manufactures more than 1000 different dyestuffs, intermediates, detergents, and special products in the electronics and plastics fields.

• Expired Patent Reports

Two series of reports listing expired patents in certain fields of wide technical interest have been announced by Patent Publications, Washington 15, D. C., with the release of a special grouping of 212 official patent extracts on the subjects of fatty oils, fatty acids, waxes, etc., and 206 on the subject of Detergents.

The patents whose extracts are shown are in the public domain and may be used by American manufacturers, the original 17-year period of validity having elapsed.

The booklet on Detergents (No. 1) contains a total of 206 Patent Abstracts divided as follows: Toilet Soaps, Household and Heavy Duty Cleaners, 54; Metal Cleaning, Pickling and Descaling, 73; Paint, Varnish and Finish Removers, 25; Textile Detergents and Cleaners, 14, and, Miscellaneous, 40. The booklet contains a subject index.

Special Report No. 2 on Fats, Waxes, etc., contains a total of 212 patent extracts reproduced from the Official Gazette and which are divided as follows: Bleaching of Oils, 8; Dehydrating, 4; Deodorizing, 4; Extraction of Oils, 14; Fatty Acids, 63; Miscellaneous, 15; Oil Processing, 48; Purification, 8; Recovery of Oil, 3; Refining of Oil, 15; Soap Processing, 16, and, Waxes, 14.

Prices of Special Reports are $2, postpaid, for No. 1 and $4, postpaid, for No. 2. Both may be obtained from Patent Publications, Box 4094, Washington 15, D. C.

• 500 Expected at 2nd Canadian Textile Seminar

More than 250 applications had been received up to Mid-July for the 2nd Canadian Textile Seminar to be held September 15-16, according to a recent bulletin by H. C. Mersereau, Secretary-Treasurer of the Seminar, assuring a capacity attendance of 500 for the Kingston, Ont., attraction.

The various committees have all reported considerable progress. Some additional papers, not mentioned in the syllabus, have been added to the program.

Information and registration forms can be obtained from Mr. Mersereau at the Nylon Division, Canadian Industries Ltd., Kingston, Ontario.

• Atlas Personnel Changes

George L. Wirtz, President of The Atlas Mineral Products Company, Mertztown, Pa., has announced the following personnel changes at Atlas:

Richard A. Weppner has been appointed Sales Engineer for corrosion-resistant chemical construction materials in Delaware, Maryland, Virginia and parts of West Virginia and New Jersey. Mr. Weppner has had over 12 years experience in sales and consultation in corrosion-resistant materials, solvents, coatings, and plastics. Prior to joining Atlas he was a Sales Engineer on corrosion-resistant products for the Pennsylvania Salt Manufacturing Company.

Philip E. Berens has been appointed Sales Representative for corrosion-resistant materials in Eastern Pennsylvania, Western New York and parts of New Jersey. Mr. Berens has served part of this territory for Atlas before and more recently has been located in the Detroit Territory. Prior to joining Atlas he was General Manager of the Electro-Chemical Supply and Engineering Co.

William A. Streaker has been appointed Sales Engineer for corrosion-proof materials in the lower peninsula of Michigan, Eastern Indiana and Lucas County in Ohio. Prior to this appointment he was in the Atlas Engineering Department. Before joining Atlas he was associated with the General Electric Co.

• '49 Statistics on Synthetic Plastics and Resin Materials

The United States Tariff Commission has released preliminary statistics on United States production and sales of synthetic plastics and resin materials in 1949. This report, the eleventh in a series showing preliminary statistics on the 1949 production and sales of synthetic organic chemicals, gives production and sales of individual synthetic plastics and resin materials as well as production and sales by chemical composition and by uses for the principal chemical classes.

The preliminary statistics on total production and sales of synthetic plastics and resin materials are said to be more than 95 per cent complete. The complete statistics will be given in the Commission's final report which will be issued later.

Copies of the section on synthetic plastics and resin materials may be obtained by writing to the United States Tariff Commission, Washington 25, D. C.

• New Dyestuff Line

A new line of dyestuffs has been announced by the Atlantic Chemical Corporation, Passaic, N. J., manufacturers of coal-tar intermediates and dyestuffs. Fastness to light, washing and resin after-treatment and resistance to resin crease-proofing and water-proofing finishes were reported among the leading properties of the new line.

Rubin Rabinowitz, president of Atlantic, in announcing the new range of direct dyestuffs said that the line uses copper complexes as an integral part of the dye molecule. Since these copper complexes which produce superior light and washing fastness are already a part of the dyestuff, costly after-treatment will be unnecessary when using the various colors of the new line, it was stated.

C. Jordan Dulin

• Dulin Joins Arnold, Hoffman

C. Jordan Dulin has joined the sales staff in the Charlotte, North Carolina office of Arnold, Hoffman & Co., Incorporated. Mr. Dulin formerly was a sales representative with the National Aniline Division of the Allied Chemical and Dye Corporation at the Greensboro office. He is a graduate of North Carolina State College.

• Seyb to Manage Diamond Research

Dr. L. P. Seyb, since 1942 a chemist and group leader in the Research Department of Diamond Alkali Company, has been named manager of research. He succeeds J. E. Underwood, who relinquishes the post he has held for the past six years to become a research consultant for the company. The announcement was made by C. C. Brumbaugh, Diamond's director of research and development, who said that these changes become effective immediately.

Dr. Seyb first came to Diamond from the Phillips Petroleum Company, Bartlesville, Okla., where he had been a chemistry assistant in the patent department for three years. His research work with Diamond as a group leader has included product development projects involving fatty acids, wetting agents, textile bleaching and flame-proofing materials, ethylene derivatives, chloro hydrocarbons, and inorganic silicates.

Mr. Underwood enters the consulting field with a distinguished record in chemistry and physics compiled over a number of years, including six with Diamond as its manager of research. Previously, he had been manager of research and development for the Pennsylvania Salt Manufacturing Company, Philadelphia, for 16 years.

From 1923 to 1927, Mr. Underwood was director of research for the National Lime Association, Washington, D. C. His extensive industrial research experience, which began in 1915 with a fellowship at Mellon Institute in Pittsburgh on a problem sponsored by the Hope Natural Gas Company, also includes service respectively with the U. S. Bureau of Mines in Colorado, the Radium Company of Colorado, and the Radium Emanation Corporation at Pittsburgh.

• New Geigy Green

Geigy Company, Inc., 89-91 Barclay Street, New York 8, N. Y., has announced the addition of a new dyestuff, Diphenyl Brilliant Green 5GW, to its line. The product is reported to possess excellent properties. The company states that the fastness to washing is even superior to some important Develop Colors.

Discharge printers should be interested in the report that neutral discharge is good, producing outstanding whites. The alkaline discharge is said to be equally favorable and reportedly enables colorists to obtain bright, pastel, vat prints on yellowish green ground of greater brightness than that obtainable with Developed dyes. Wash fastness and safety in print washing is claimed better than is realized with green grounds dyed with direct yellows and blues.

Bulletins covering Diphenyl Brilliant Green 5 GW are presently being prepared, and those interested may be placed on the mailing list immediately on release, by writing to Geigy. Samples for testing purposes are available.

• Dr. Brady Joins Grasselli Staff

Dr. Lynn J. Brady, Long Valley, N. J., has joined the professional staff of Grasselli Works Division, General Aniline and Film Corporation, according to an announcement by Plant Manager Russell I. Baker. Dr. Brady's duties will include supervision of the Control Section of Process Development at General Aniline's large Linden plant. Dr. Melvin R. Stevinson, 872 Colonial Avenue, Union, is manager of the Process Development Department.

Dr. Brady was Supervisor of technical service of the Air Reduction Co., New York, N. Y., until assuming his present post. Following a Fellowship at Mellon Institute, Pittsburgh, early in 1941, Dr. Brady accepted an appointment as head of the Physics Department of Hooker Electrochemical Co., Niagara Falls. He joined the Air Reduction Co. a year later.

Dr. H. R. McCleary

• Calco Announces Research Appointment

Appointment of Dr. H. R. McCleary as Sectional Director, Application Research Department, has been announced by Dr. R. H. Kienle, Director of Application Research, American Cyanamid Company, Calco Chemical Division, Bound Brook, New Jersey.

Dr. McCleary has been identified for several years with the study of physical chemical properties of dyes and dyeing and the application of physical chemical techniques to Calco research, development and manufacturing problems. In his new capacity, he will assist on special assignments covering all of the activities of the Physical Chemical Research Section.

Dr. McCleary joined the Calco Physical Chemical Research staff in 1941.

• Falcon Appointed Harrison Technical Director

Herbert A. Harrison, President of A. Harrison & Co., Inc., Manufacturing Chemists of Pawtucket, R. I., has announced the appointment of James G. Falcon of Rumford, R. I., as Technical Director.

Mr. Falcon has served in various capacities with the Farwell Bleachery, Pacific Mills, American Woolen Co., Aspinook Corp., and more recently with the Aktivin Division of Heyden Chemical Corporation.

• Antara Booklet on Surfactants

The action of surfactants is explained in a booklet just published by Antara Products, General Aniline & Film Corporation, 444 Madison Ave., New York 22, N. Y.

The word "surfactants" is itself new, a contraction of "surface active agents," recently coined by Antara.

Copies are available on request by writing on company letterhead to Antara Products.

• Du Pont Honors Dr. Benger

The Acetate Research Laboratory of the Du Pont Company's Rayon Department at Waynesboro, Va., has been named "The Benger Laboratory" in honor of Dr. Ernest B. Benger, former manager of the Rayon Technical Division, it has been announced.

An authority on synthetic textile fibers and packaging films, Dr. Benger retired three years ago on the 30th anniversary of his employment with the company as a research chemist.

• 15 States Represented in USTC Refresher Course

Members of this year's class in the annual Refresher Course in Textiles and Testing Techniques sponsored by the United States Testing Company, Inc., reportedly represent fifteen different states as well as representatives of the Navy and the Quartermaster Corps of the Army. This is the thirteenth year the company has conducted this course.

The class recently spent registration day morning in an introductory tour through the company's building and laboratories and were then officially welcomed by the company's president, A. L. Brassell, and Dr. Dorothy Houghton of Teachers College, Columbia Universty, at a luncheon at the Swiss Town House. Attending the luncheon, also, were various executives and members of the management staff of the United States Testing Company, Inc.

The class is being given an intensified course in testing methods and procedures in the various phases of work covered in the company laboratories. The course comprises a series of lectures supplemented by actual laboratory demonstrations conducted by many of the Company's scientists and technical experts.

• Zinc Acetate Bulletin

A new bulletin by Niacet Chemicals Division, United States Vanadium Corporation, 971 Niagara Building, Niagara Falls, N. Y., on Niacet Zinc Acetate presents the physical and chemical properties, latest specifications, and shipping and handling information on this chemical. Zinc acetate is a mordant or a resist, depending on the nature of the dyestuffs, in the printing and dyeing of fabrics. Its use as a weighting agent for silk is reported. The treatment of silver polishing cloths with zinc acetate to inhibit sulfur tarnishing of silverware and trophies is also described. Copies of Niacet bulletin 5 are available on request.

BOOK REVIEW

Chemical Engineers' Handbook. Third Edition

Edited by John H. Perry, McGraw-Hill Book Company, New York. 1,942 pages. $15.00.

The new edition of Perry's Chemical Engineers' Handbook is virtually rewritten in many sections but has become more unwieldy than ever in the process. The term handbook has indeed become a misnomer for a book weighing over 5 pounds and measuring approximately 10 inches by 7½ inches by 2½ inches. It seems to the present reviewer that the time has come to consider a breakup into two volumes or elimination of some of the less essential sections, which are readily available from other sources.

The above protest is, however, the only major criticism which can be made of this valuable reference source for the chemical engineer. New material pertaining to Furnaces and Kilns, Size Enlargement, General Theory of Diffusional Operations, Fluid Flow, etc., has been added, while several sections, e.g., Drying, have been entirely rewritten. This latter topic is of particular interest to the textile chemist and he will find in this section a very full treatment of drying theory and practice, the latter including data on tenter driers and slashers, although no reference to the latter is made in the index.

There is little information on the properties of textile fibers and materials. The one figure dealing with the moisture content of the natural fiber textile materials over the relative humidity range is old data, no account having been taken of the recent work at Princeton.

The section on Process Control is particularly provocative of thought to the production man, either in the textile or any other industry. Careful study of this Section should be a valuable guide to the nonspecialist when faced with some new problem in instrumentation.

Complete perusal of a work of this type is of course, impossible; by a process of "dip and read" the reviewer found only comparatively minor misprints and is again impressed, as by the First and Second Editions, with the general utility of this book primarily to the chemical engineer and secondarily to his professional cousins, such as the textile chemist.—G.B.

Calco

for
economical,
clear navy blues
in cotton
printing

CALCONYL*

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BLUE G SINGLE SOLUTION

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*Trade-mark

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DYESTUFF DEPARTMENT
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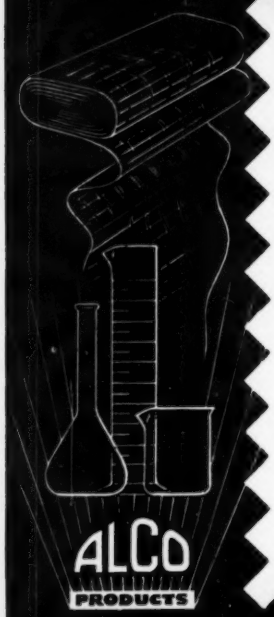

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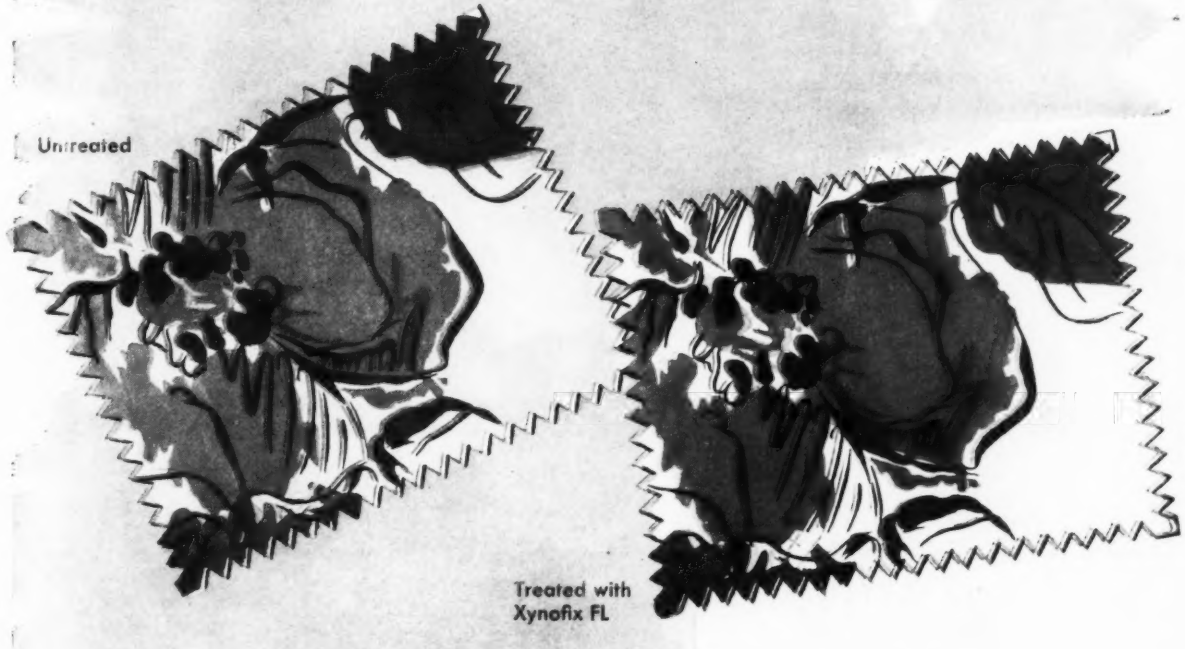

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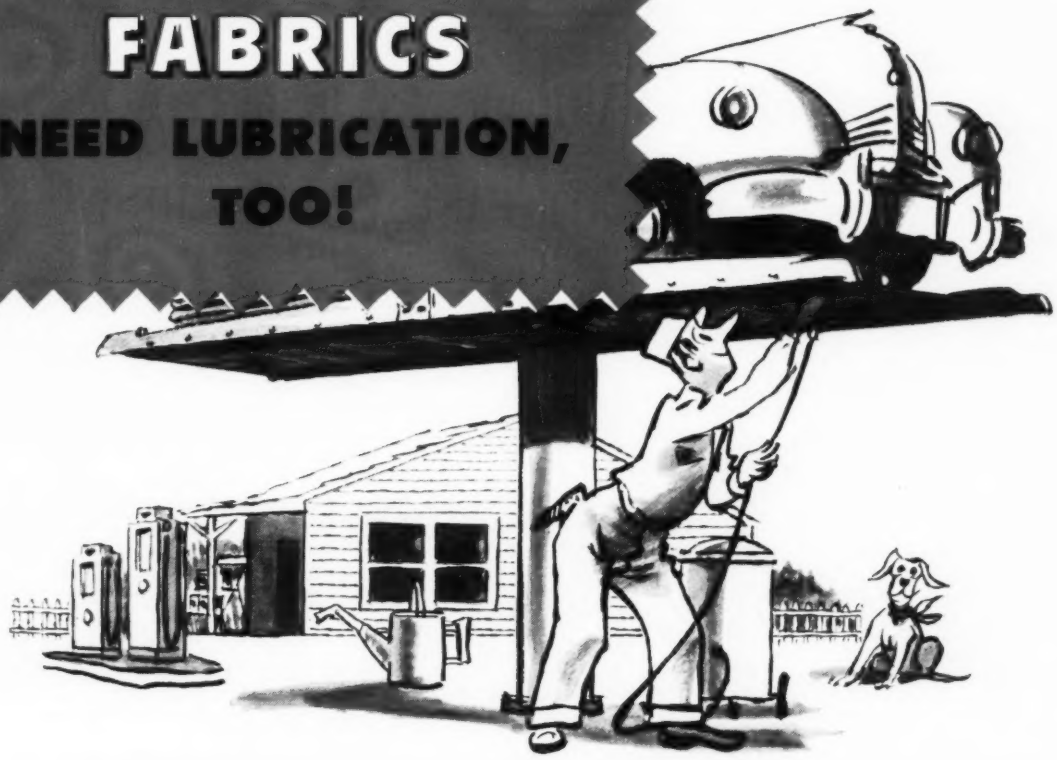

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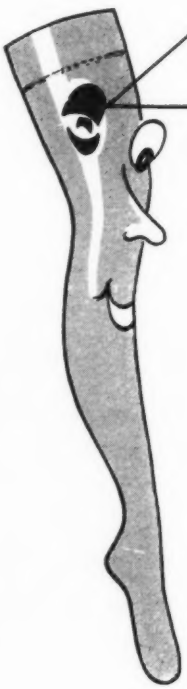

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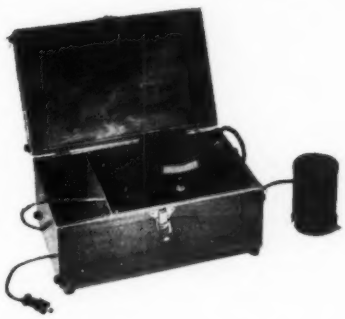

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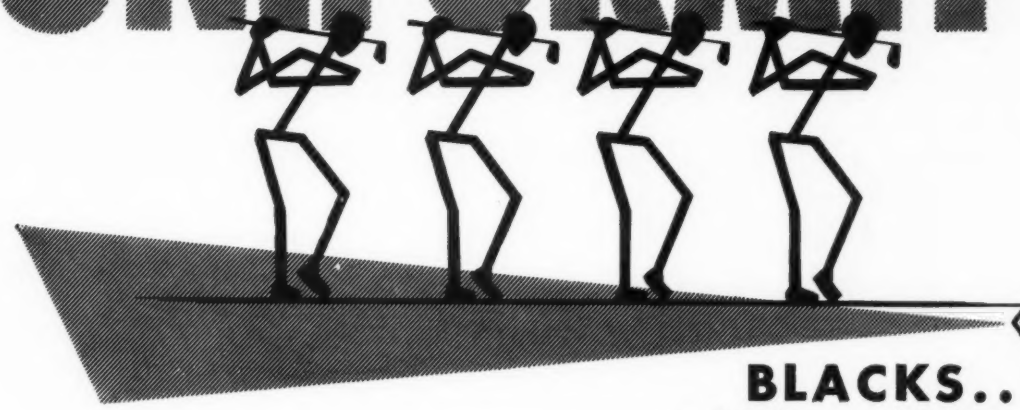

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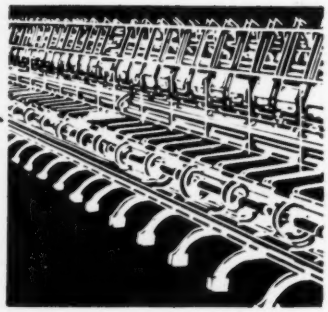

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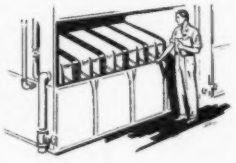
IN TEXTILE DYEING
As a Leveling Agent in the Bath



IN MANUFACTURING DYES
For Standardizing Dyes

FOR PURITY PROCESS USE, investigate the advantages of General Chemical's Anhydrous Glauber's Salt. Here is a product developed to meet the most exacting quality specifications.

In many operations, it contributes toward increased efficiency and greater economy. It may offer similar opportunities in your process too.

To investigate, 'phone or write the nearest General Chemical office listed below.

HIGH PURITY —Due to rigid manufacturing quality controls, General's Anhydrous Glauber's Salt consistently assays 99.9% Na_2SO_4.

GOOD SOLUBILITY —Goes into solution readily and is practically free from undesirable impurities.

EFFICIENT — Produces sparkling clear solutions; helps prevent contamination of dyes or colors.

ECONOMICAL —Highly concentrated form offers economies in shipping costs.

READILY AVAILABLE —Always stocked throughout General Chemical's chain of distributing stations in textile centers from coast to coast.

BASIC CHEMICALS

FOR AMERICAN INDUSTRY

GENERAL CHEMICAL DIVISION

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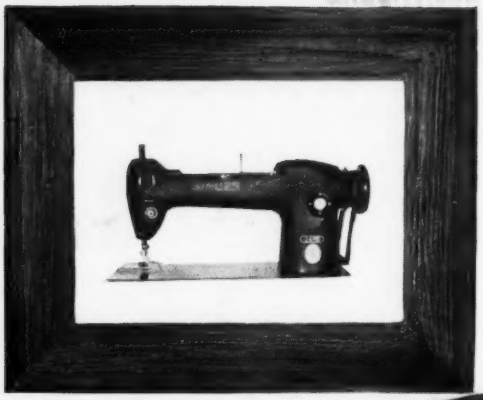

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for better sewing...better selling

treat your fabrics with

Cyanamid Textile Chemicals

suppleness

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good hand

Because fabric quality depends upon chemical quality, Cyanamid maintains rigid control over every step in the manufacture of its products. Moreover, Cyanamid offers you a *complete* line... so just specify the properties you want in your fabrics and our Cyanamid representative will specify the chemicals to do a good job.

Cyanamid's Textile Chemicals Include:
DECERESOL® Wetting Agents, NO-ODOROL® Finishing Oils, AQUASOL® Sulfonated Castor Oil, Penetrants, Sizing Compounds

level dyeing

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